

Intravascular Access Devices (IVAD) - Infection Prevention & Control

Summary The Intravascular Access Device (IVAD) Infection Prevention & Control Policy has been developed to provide guidance on the minimum standards for insertion, management and removal of IVADs, in order to minimise the adverse health impacts on patients and reduce burden of Healthcare Associated Infections (HAIs).

Document type Policy Directive

Document number PD2019_040

Publication date 16 August 2019

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Replaces PD2011_060, GL2013_013

Review date 16 August 2024

Policy manual Not applicable

File number H19/66434

Status Active

Functional group Clinical/Patient Services - Medical Treatment, Nursing and Midwifery
Personnel/Workforce - Industrial and Employee Relations
Population Health - Communicable Diseases, Infection Control

Applies to Ministry of Health, Public Health Units, Local Health Districts, Board Governed Statutory Health Corporations, Chief Executive Governed Statutory Health Corporations, Specialty Network Governed Statutory Health Corporations, Affiliated Health Organisations, NSW Health Pathology, Public Health System Support Division, Cancer Institute, Government Medical Officers, Community Health Centres, NSW Ambulance Service, Dental Schools and Clinics, Public Hospitals, Environmental Health Officers of Local Councils, Private Hospitals and day Procedure Centres

Distributed to Ministry of Health, Public Health System, Divisions of General Practice, Government Medical Officers, NSW Ambulance Service, Environmental Health Officers of Local Councils, Private Hospitals and Day Procedure Centres, Health Associations Unions, Tertiary Education Institutes

Audience All NSW Health Organisations (including Affiliated Health Organisations) and NSW Ministry of Health

INTRAVASCULAR ACCESS DEVICES (IVAD) INFECTION PREVENTION AND CONTROL

PURPOSE

The purpose of the NSW Health Intravascular Access Device (IVAD) Infection Prevention and Control Policy is to provide guidance to NSW Health Organisations (HO's) including Affiliated Health Organisations on the minimum standards for insertion, management and removal of IVADs, in order to minimise the adverse health impacts on patients and reduce burden of healthcare associated Infections (HAIs). This Policy is to be read in conjunction with NSW Health Infection Prevention and Control Policy.

MANDATORY REQUIREMENTS

All clinical staff who insert IVADs or care for a patient with an IVAD must comply with this Policy Directive. For each insertion a record of insertion must be completed.

Every IVAD insertion, management and removal must be documented at the time of care or as soon as possible afterwards.

HO's must have local guidelines or procedures in place to support the technical and procedural aspects for using and managing these devices for clinicians.

HO's must support clinicians to ensure adherence with this Policy Directive.

Aseptic technique must be adhered to during each IVAD insertion, management and removal to reduce the risk of local or systemic infection.

IMPLEMENTATION

NSW Health Organisations (HOs) and the governance structure for the implementation of this Policy Directive to reduce the risk of healthcare associated infections (HAIs).

Clinical Excellence Commission

- Provides tools to support the implementation, monitoring and evaluation of this Policy.

Health Education and Training Institute (HETI)

- Compliance with the existing mandatory education components (Aseptic technique, Hand Hygiene and Infection prevention and Control Practices from HETI online) applies.

Chief Executive of Local Health District and Specialty Health Network

- Assigns leadership responsibility, personnel and resources to implement and comply with this Policy.

Directors of Clinical Governance

- Ensure that this Policy is communicated to all managers and health workers.
- Ensure local infection prevention and control programs and systems are in place to implement and monitor this Policy.

- Monitor and provide regular reports on the progress and outcomes of infections related to IVADs.
- Monitor, evaluate and address issues with compliance with this Policy.

Clinical leaders and senior managers

- Provide resources and equipment necessary for compliance with this Policy.
- Implement and evaluate local infection prevention and control systems.

Infection prevention and control professionals

- Provide leadership in infection prevention and control surveillance and reporting.
- Provide advice on compliance with the insertion, management and removal of IVADs policy within their health organisation.
- Provide leadership in the management of HAIs or other transmission risks and in the communication of these risks to health workers, patients, volunteers, carers and visitors.

Clinical Staff Inserting, Caring for, Managing and Removing IVAD Devices

- Comply with IVAD Infection Prevention and Control, Insertion and Post Insertion Care policy this Policy.
- Are trained, competent and assessed in the insertion, management and removal of an IVAD device in accordance with this Policy Directive.
- Ensure IVAD insertion and care is documented in the patient's health record.
- Assess and document daily the ongoing need for an IVAD device.

REVISION HISTORY

| Version | Approved by | Amendment notes |
|-----------------------------|---|---|
| August-2019 (PD2019_040) | Deputy Secretary, Patient Experience and System Improvement | New policy developed to replace and supersede: 1) PD2011_060 Central Venous Access Device Insertion and Post Insertion Care. 2) GL2013_013 Peripheral Intravenous Cannula (PIVC) Insertion and Post Insertion Care in Adult Patients. |

ATTACHMENTS

1. Intravascular Access Devices Infection Prevention and Control Insertion and Post Insertion Care: Procedures.

**Intravascular Access Devices (IVAD) –
Infection Prevention and Control**



Issue date: August-2019

PD2019_040

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1 BACKGROUND

1.1 Background

Intravascular access devices (IVADs) are commonly used in a variety of settings. They are used to provide a route for administering intravenous medications, fluids, blood products and nutrients and may be used for haemodynamic monitoring, short to long term intravascular access, renal therapies and blood specimen collection.

Intravascular access devices provide direct access to the patient's bloodstream and therefore pose a serious risk for infection of microorganisms to be introduced either at the time of insertion or while the device is in situ. Device-related infections are associated with increased morbidity and mortality, prolonged hospital stay and additional healthcare costs.

Central Venous Access Devices (CVAD) pose a risk of air embolism in patients during insertion and removal (1).

Correct use and management of IVADs minimises the risks of device related infection to patients (2). The health service organisation must have a process for the appropriate use and management of invasive medical devices (3).

1.2 About This Document

This Policy outlines the minimum infection prevention and control requirements for IVADs for NSW Health Organisations (HOs). It has been developed for clinicians who insert, use/manage and remove devices and for persons responsible for surveillance and control of infections in hospital, outpatient, and home healthcare settings. It is recognised that in a clinical emergency, the principles of insertion outlined in this Policy may be difficult to meet. In these situations a risk assessment should be undertaken and the intravascular device replaced as soon as clinically appropriate.

This Policy integrates evidenced-based knowledge with clinical expertise to:

- Support appropriate device management within NSW HOs
- Prevent device related infections
- Prevent adverse events
- Assist NSW HOs to meet the requirements for Standard 3 of the National Standards for Quality Healthcare Services

1.3 Scope

This Policy focuses on infection prevention and control (IP&C) for IVADs. Some aspects outside of IP&C are also included to assist in guiding the overall management of IVADs.

This Policy sets out the minimum standards to ensure the safe use of devices and should be used in conjunction with the manufacturer's instructions relating to individual catheters, connections, administration set dwell time, and compatibility with antiseptics,

medications and other fluids. HO's who use these devices must have local guidelines or procedures in place to support the technical and procedural aspects for using and managing these devices.

The Policy is applicable to all patient care settings in which devices are inserted, managed or removed. This Policy is applicable across all patient populations (e.g. adults, ambulance, pre-hospital, hospital in the home, paediatrics and neonatology).

The following devices have been included in this Policy:

- Peripheral intravenous cannula (PIVC)
- Midline catheters
- Central venous access devices (CVAD)
 - Peripherally inserted central catheter (PICC)
 - Tunnelled cuffed and non-cuffed central venous catheter
 - Non-tunnelled central venous catheter
 - Implantable Venous Ports (Port)
- Umbilical catheters
- Peripheral artery catheters
- Pulmonary artery catheters
- Haemodialysis catheters

The following items are out of scope for this Policy:

- Technical or procedural aspects related to the above devices
- Sub-cutaneous devices
- Arteriovenous (AV) fistulas
- Anticoagulants
- Intraosseous devices

1.4 Key definitions

A detailed [glossary](#) of terms can be found at the back of the Policy

| | |
|---|---|
| <p>Central Venous Access Device (CVAD)</p> | <ul style="list-style-type: none"> • A catheter inserted through an upper or lower peripheral or central vein where the catheter tip terminates in: <ul style="list-style-type: none"> ○ For upper body access: superior vena cava/right atrial (SVC/RA) cavo-atrial junction. ○ For lower body access: the common iliac vein or abdominal vena cava • These catheters are used for the administration of parenteral fluids and medications that are typically not suitable via a short peripheral catheter. They are also used for the measurement of central venous pressure in critical care setting. <ul style="list-style-type: none"> ○ <i>Centrally</i>- inserted central venous catheters have a skin entry point in the neck or trunk. ○ <i>Peripherally</i>- inserted central catheters have a skin entry point on a limb or the scalp. ○ <i>Non-Tunnelled</i>- the catheter insertion and exit points are the same • <i>Tunnelled</i> - the catheter is inserted through one point and then “tunnelled” under the skin to a remote exit point. |
| <p>Implantable Venous Port (port):</p> | <p>Long term CVAD, which is surgically placed under the skin from the insertion site to a separate exit site. The exit site is typically located in the chest, but can be located elsewhere for comfort and aesthetic reasons (e.g. inner bicep, abdomen and thigh). They can be multi lumen. Ports consist of two main parts: the portal reservoir and a catheter. The tip of the catheter resides in the cavo-atrial junction. Also known as a port-a-cath or a venous port.</p> |
| <p>Intravascular access device (device)</p> | <p>Catheters, tubes, or devices inserted into the vascular system, including veins, arteries, and bone marrow.</p> |
| <p>Midline Catheter</p> | <p>A long peripheral catheter inserted into the upper arm via the basilic, cephalic, or brachial vein, with the internal tip located at or near the level of the axilla and distal to the shoulder.</p> |
| <p>Non-tunnelled CVAD- Also known as Percutaneous CVAD</p> | <p>A device that enters the venous system. Non-tunnelled catheters are generally used for short term therapy and in emergency situations.</p> |
| <p>Peripheral Artery Catheter</p> | <p>An arterial line (also art-line or a-line) is a thin catheter inserted into an artery.</p> |
| <p>Peripheral intravenous cannula (PIVC)</p> | <p>A catheter (small, flexible tube) placed into a peripheral vein for intravenous access.</p> |
| <p>Peripherally inserted central catheter (PICC)</p> | <p>A catheter inserted through the veins of the upper extremities in adults and children; upper or lower extremities in neonates, catheter tip is located in the superior or inferior vena cava, preferably in the cavo-atrial junction</p> |
| <p>Health Organisation (HO)</p> | <p>For the purpose of this Policy a Health Organisation is: Local Health District, Speciality Health Networks, Statutory health corporation that provides inpatient services, or Affiliated health organisation in respect of its recognised establishments that provide inpatient services.</p> |
| <p>Pulmonary Artery Catheter</p> | <p>Also known as a Swan-ganz catheter, is a catheter inserted into a large central vein, with the tip residing in a pulmonary artery. Its purpose is diagnostic and</p> |

therapeutic; it is used to detect heart failure or sepsis, monitor therapy, evaluate the effects of drugs, frequent blood sampling and to infuse medication.

Tunnelled CVAD

A central vascular access device (CVAD) with a segment of the catheter lying in a subcutaneous tunnel with the presence of a cuff into which the subcutaneous tissue grows to offer security for the catheter; indicates that the skin exit site and vein entry site are separated by the subcutaneous tunnel.

Umbilical Catheter

Catheter that is inserted into one of the two arteries or vein of the umbilical cord.

2 EDUCATION & DOCUMENTATION

2.1 Staff Education and Training

- All staff involved in the insertion, management and removal of IVADs must complete an educational program that is appropriate for the care being provided as determined by their HO.
- Clinicians are responsible and accountable for attaining and maintaining currency of skills for device insertion, management and removal within their scope of practice (4).
- HOs should have systems in place to recognise prior competence/skills assessment of the clinician from other HOs.
- The role, responsibilities and accountability for each type of clinician involved with these devices must be clearly defined in organisational policy or procedure (4).

2.1.1 Competency Assessment for Intravascular Access Devices (IVADs)

- Clinicians who insert, manage and remove IVADs must undergo training and formal competency assessment, as determined by the HO and is consistent with best practice.
 - Competency assessment must be conducted to establish proficiency to perform these skills independently and may be undertaken on an ongoing basis as necessary.
 - Competency validation must be documented in accordance with organisational policy.
- Clinicians working towards formal competency must be supervised by an experienced and competent clinician

2.2 Patient Education

- The level of the education program provided to the patient and/or caregiver should be determined by the:
 - criticality of the patient
 - cognition of the patient
 - ability to manage the IVAD
 - type and duration of the IVAD
- The clinician should educate the patient and/or caregiver while in hospital or hospital in the home and before discharge on:
 - the procedure and need for the device
 - signs and symptoms of infection
 - signs of air embolism
 - what to do if it becomes disconnected or accidentally removed

- practice and principles of caring for the device
- infection prevention strategies for their device
- Patients and/or carers in the community must be provided with appropriate material that includes who to contact for advice or in the case of an emergency

2.3 Documentation

- Documentation in health care records must provide an accurate description of each patient/client's episodes of care or contact with health care personnel NSW Policy Directive [Health Care Records - Documentation and Management \(5\)](#).
- Each HO must determine where clinical information relating to devices is to be documented in the patient's health record and that this is applied consistently so that clinical information can be readily accessed as needed. This is particularly important for devices with a longer dwell time.
- All clinical incidents must be reported and documented as per the NSW Health, PD2014_004 Incident Management Policy (6).
- Follow Australian Commission on Safety and Quality in Health Care (ACSQH) guidelines for labelling requirements. NSW Health Policy Directive [User-applied Labelling of Injectable Medicines, Fluids and Lines \(7\)](#)

2.3.1 Insertion

- Minimum documentation requirements at insertion by the proceduralist/procedure assistant are: A Central Venous Line Insertion Record or equivalent must be completed by the proceduralist inserting the device or their assistant for all CVADs which should include the below information:
 - Patient education and consent, refer to [Consent to Medical Treatment \(8\)](#).
 - Date and time of insertion, number of attempts, reason for insertion, local anaesthetic (if used), and the technique used, including visualisation and guidance technologies.
 - Site preparation, infection prevention and safety precautions taken.
 - The type, length, and gauge/size of the device (for PIVC); including the lot number for all CVADs and implanted devices.
 - Identification of the insertion site by anatomical descriptors and landmarks.
 - Confirmation of the location of the catheter tip for all CVADs prior to initial use.
 - Confirmation of patency and ready for use.
- This Record must be placed in the patient's health care record.

2.3.2 Post-Insertion

While the patient is admitted to hospital the condition of every IVAD must be documented at least once per nursing shift. The documentation must detail (4):

- Condition of the site, dressing, catheter securement, dressing change details, site care, and any changes related to the device or site.
- Length of CVAD catheter from skin to hub (to assess potential migration).
- Patient reported symptoms.
- Device function (e.g. patency, lack of resistance when flushing, presence of a blood return upon aspiration).
- Equipment/infusion type used for administration of Intravenous (IV) therapy.
- The Visual Infusion Phlebitis (VIP) score if used or any signs of infection

2.3.3 Administration Sets

All labelling of administrations sets used in continuous infusion must be documented in accordance with [NSW Health Policy Directive User-applied labelling of injectable medicines, fluids and lines](#) (7). If the lumen has an indwelling lock solution, the lumen must be clearly labelled so that it is not inadvertently flushed into the patient (7).

2.3.4 Removal

Minimum documentation requirements on removal of devices is:

- Date and time of device removal, reason for removal, condition of the site, and whether the catheter length and/or tip were complete and intact.
- Dressing applied.

Any continuing management of complications including site observation and documentation post removal.

2.3.5 Infection

Incidents of infection/phlebitis at the insertion site must be reported to Incident Information Management System (IIMS) or as per other local reporting requirements (6).

If a catheter related site infection or Blood Stream Infection (BSI) is suspected or confirmed this must be documented clearly in the patient medical record, if cultures are obtained, document the source of culture(s). The documentation should include a management plan and actions taken.

If IVAD site infections are suspected to have progressed to a systemic infection (bacteraemia) then notify as a Safety Assessment Code (SAC 2; all staphylococcus aureus bacteraemia must be recorded as a SAC 2).

Compliance with reporting mandatory Key Performance Indicators (KPIs) including routine reports on IVAD associated infections should be communicated to relevant stakeholders, peak organisational, governing and executive committees (6, 9).

3 PRE-INSERTION

3.1 Considerations when Choosing a Device

The risk of infection can be dependent on device site and selection. The following should be considered (10) as contributing to this risk: (see [Section 4.2](#) for more information).

- Comorbidities, prolonged use and sites with frequent movement.
- History of mastectomy, arteriovenous (AV) fistula or graft, haematological disorders, history of device complications, obesity, coagulopathy, previous surgery, failed or difficult device access or immunocompromised.
- Therapeutic purpose: the infusate characteristics, complexity of infusion regime, availability of peripheral access sites.
- Estimated length of time: long-term intermittent therapy, treatment anticipated for more than 3 weeks.
- Vein status: veins may be difficult to access, torturous, fragile, hidden or deep.

3.1.2 Bundles

Infection prevention and control bundles reduce the risk of healthcare associated infections (11, 12). Facilities should develop bundles that are both evidence based and include local clinical risks. The principles for developing a bundle include:

- A manageable list of interventions that are descriptive and meet local requirements.
- Processes for documentation and assessment that considers clinical judgment in decision making.
- Input from the multidisciplinary team in developing the bundle.
- Monitoring and communication to clinical teams.

4 INSERTION

4.1 Prophylaxis, antimicrobial impregnation, coating or bonding

- The following should not routinely be used for the prevention of infection when inserting an intravascular device:
 - Systemic antibiotic prophylaxis (13-17).
 - Antibiotic or antiseptic ointment (13, 18).

- Antimicrobial-impregnated catheters may be considered for specific population based on patients' risk factors and clinical presentation (19-21).
- The use of bonded connections and valves are beneficial in reducing the risk of air embolism and infection (22).

4.2 Device Selection, Site Selection, and Device Securement

4.2.1 Peripheral Intravenous Cannula (PIVC)

Device Selection

- Clinicians should use the smallest gauge and shortest length PIVC that will accommodate the anticipated therapy to reduce the risk of phlebitis.
- See [Attachment 1 PIVC Device Selection Guide](#) more information.

Site Selection

- Optimal site selection for PIVC is the distal areas of the upper extremities (e.g. Forearms) (3, 13).
- Basilic or cephalic veins on the posterior (dorsal) forearm are the preferred site for catheterisation (3).
- The site selected should be accessible and functional during surgery and procedures.
- Veins should be selected on the non-dominant forearm if practical (especially if the catheter is to remain in position for any length of time) (3).
 - Avoid veins of the lower extremities unless necessary, due to risk of tissue damage, thrombophlebitis, and ulceration.
 - Rotate PIVC site and arm where possible for repeated cannulations.
 - Replace a catheter inserted in a lower extremity, to an upper extremity as soon as possible.
 - Avoid compromised areas, areas of flexion e.g. antecubital fossa and areas of pain on palpation.
- For paediatrics, preference should be given to sites that are long lasting for duration of therapy (e.g. hands, forearm and upper arm).
 - Upper or lower extremities or the scalp (last option) can be used as the catheter insertion site (13).
 - Avoid hand or fingers, or the thumb/finger used for sucking in infants.
 - Avoid the right arm of infants and children after procedures treating congenital cardiac defects that may have decreased blood flow to the subclavian artery.

Securement

- The catheter should be stabilised with a transparent dressing and sterile adhesive tape or sterile adhesive/wound closure strips, to prevent catheter dislodgement (13, 23).
- For paediatrics use of IV board/splints are recommended to secure PIVC placed in or adjacent to areas of flexion. Follow local policy or guidelines for strapping and securement of PIVCs.

4.2.2 Midline Catheters

Device Selection

- Use the smallest gauge of midline catheters that will accommodate the prescribed therapy to reduce the risk of phlebitis and thrombosis (24, 25).

Site Selection

- Vein selection should be based on the biggest and most superficial vein above or directly below the antecubital fossa to allow normal arm movement and function. The catheter should not be placed at the antecubital fossa crease/fold or pass the axillary crease/fold.

Securement

- A sutureless securement device is preferred to reduce the risk of infection (26).

4.2.3 Central Venous Access Device (CVAD)

Device Selection

- Use the smallest gauge of CVAD that will accommodate the anticipated therapy to reduce the risk of phlebitis (27).
- The minimum necessary number of lumens and add-ons (manifolds, stopcocks and multi-extension sets) should be used.
- Heparin-coated catheters are not recommended (28).

Site Selection

- For PICCs select the basilic (preferred), cephalic, and brachial veins (with sufficient size) of the antecubital space or brachial veins (29, 30).
- In neonates the upper and lower extremities have similar complication rates.
- Use a subclavian or internal jugular site rather than a femoral site where possible, in adult patients to minimise infection risk for non-tunnelled CVC placement (31).
 - If the patient has chronic kidney disease, consider the internal jugular vein or, secondarily, the external jugular vein, weighing benefits and risks for each access site due to the risk of central vein stenosis (32).
 - Subclavian vein should be avoided for temporary access in patients with chronic renal failure due to the risk of central vein stenosis (33).
 - In patients with chronic renal failure be aware if a limb is being preserved for future haemodialysis access.

- For internal jugular sites, the right side of the patient is favoured as vessel anatomy allows direct access to the superior vena cava/inferior vena cava and provides a shorter and easier route for the practitioner inserting the device (34).

Securement

The CVAD must be secured (26) at the skin insertion point and anchor point (if present) by:

- A sutureless securement device (preferred to reduce the risk of infection) OR
- Direct suturing at the hub and three-way bifurcation anchor point.

4.2.4 Implanted Venous Port (port/IVP)

Device Selection

- Catheters made of radiopaque silicone rubber or polyurethane are preferred.
- Ports made of various materials including plastic, titanium, silicone rubber, polyurethane, and a combination of these substances can be used.
- The life of the septum is dependent 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 (35).

Site Selection

- Port pocket site selection should allow for placement in an area that provides good port stability, does not interfere with patient mobility, does not create pressure points or interfere with clothing (36).

Securement

- The suture line closing the port should not be located over the septum of the port (36).
- Umbilical catheters are commonly secured using the goalpost method, refer to local guideline or procedures for more information.

4.2.5 Peripheral Artery Catheter

Device Selection

The catheter must be flexible, resistant, as radiopaque as possible, thin walled with a high internal to external diameter ratio (37).

Site selection

- The radial artery is preferred due to its accessibility and good collateral flow, however the femoral, brachial or pedal artery may also be used (1).
- The brachial site should not be used in paediatrics (13).

Securement

- A sutureless securement device (preferred to reduce the risk of infection) OR

- Direct suturing at the hub and three-way bifurcation anchor point.

4.2.6 Pulmonary Artery Catheter

Device Selection

The catheter must be flexible, resistant, as radiopaque as possible, thin walled with a high internal to external diameter ratio (37).

Site selection

- The preferred site is the right internal jugular vein followed by the left subclavian vein.
- The femoral and antecubital veins should be avoided if possible.

Securement

- A sutureless securement device (preferred to reduce the risk of infection) OR
- Direct suturing at the hub and three-way bifurcation anchor point.

4.3 Confirmation of Tip Position for Central Catheters

The catheter tip position must be confirmed when a device is inserted, by any of the following techniques prior to use (38, 39):

- ECG CVAD tip confirmation
- Chest x-ray or image intensifier
- Fluoroscopy imaging and Digital Subtraction Angiography (DSA)
- Computed Tomography (CT)
- Magnetic Resonance Imaging (MRI)
- Pressure monitoring of the central venous waveform in operating theatre until formal confirmation post-surgery

Once the CVAD distal tip position is confirmed via any of the above, the “final Tip position” of the catheter must be documented (the total catheter length and external/inserted length (skin to hub) in the patients’ medical record. This then becomes the clinician’s primary referral source for written confirmation of tip position.

- This must be completed by the clinician inserting the device, their assistant or delegate for all insertions.

4.4 Standard Precautions (At Insertion)

Standard precautions are the minimum precautions required and must always be applied when caring for patients (4).

- During an emergency situation (e.g. rapid deterioration and ambulance) time does not always permit use of aseptic technique or full maximal barrier precautions, the clinician should make every effort within their environment to maintain asepsis and

adhere to standard precautions. If inserted in an emergency, the IVAD must be replaced as soon as the patient is stable (within 24 hours).

The precautions outlined in sections 4.4.1 to 4.4.4 are the minimum requirements when inserting a device.

4.4.1 Hand Hygiene

- Perform hand hygiene before insertion procedures, refer to table 2 below.
- Hand hygiene should be performed before and after palpating catheter insertion sites as well as before and after inserting, replacing, accessing, repairing, or dressing.
- Palpation of the PIVC insertion site should not be performed after the application of antiseptic, unless non-touch technique is maintained or sterile gloves are used. If you need to palpate the planned insertion site after skin antisepsis to confirm anatomy, repeat the application of antiseptic.

The use of gloves does not eliminate the need for hand hygiene (before putting on gloves and after removal).

Table 2: Hand Hygiene for Device Insertion

| Activity | | Hand Cleansing Product* | Duration of Hand wash* |
|-------------------|--|---|--|
| Aseptic Procedure | Insertion of PIVC | ABHR* | 30-60 seconds |
| | | Liquid antimicrobial soap and running water | 40-60 seconds |
| | Peripheral Arterial Catheter | ABHR* | 60 seconds minimum |
| | | Liquid antimicrobial soap and running water | |
| | Insertion of CVAD, Midline and Umbilical Catheters | Liquid antimicrobial soap and running water | 2 minutes |
| | | Alcohol Based Surgical Hand Rub (ABSHR*) | Refer to manufacturer's instructions. Note: Prior to surgical rub, wash hands, forearms and nails using a non-medicated soap and running water. |

*Manufacturers recommendations should be followed for the amount of solution and duration

4.4.2 Aseptic Technique

- All clinicians involved in the insertion of devices must have appropriate training and assessment of aseptic technique, refer to section [2.1 Staff Education and Training](#).
- Aseptic technique must be maintained for the duration of the procedure, this includes:
 - Hand hygiene.
 - Maintaining aseptic fields.

- Once insertion site has been prepped aseptic technique must be maintained and the site must not be touched (unless sterile gloves are worn).
- Procedures must be performed using non-touch technique protecting key sites and key parts. The cap/cover must remain on the device to maintain asepsis.
- Personal protective equipment (PPE) must be worn as per standard precautions.
- Ensure a logic, efficient and safe order of the procedure.
- Equipment or items dropped on the floor must be discarded (even if there is a cap/cover on) and replaced.
- Ultrasound transducers used for imaging the vascular system for insertion of venous access devices should be used with a sterile probe cover and sterile gel. The transducer probe must be cleaned and disinfected adequately in between use. Follow manufacturers' instructions for use.
- A clean environment must be maintained throughout the procedure. Environmental controls to achieve this include; IVAD insertion trolley or procedure tray is to be cleaned, no room cleaning (buffing or polishing) immediately prior to, or during the procedure. The procedure should take place in a closed room or with curtains drawn around the patient zone to minimise air currents.

4.4.3 Personal Protective Equipment

Clinicians should wear appropriate personal protective equipment based on risk assessment and likelihood of exposure to bodily fluids.

Glove Use

- The use of non-sterile examination or sterile gloves will depend on the procedure being undertaken, contact with susceptible sites or clinical devices, the risks involved and the HO guidelines or procedures that are in place.
- For PIVC insertion gloves should be worn immediately after performing hand hygiene.
 - HOs should have in place local guidelines or procedures determining the type of gloves for PIVC insertion based on local needs and clinical risk.
 - Gloves considered in local guidelines or procedures may include; sterile procedural gloves, sterile gloves, non-sterile gloves.
- See below [4.4.4 Maximal Barrier Precautions](#) for more information (4).

4.4.4 Maximal Barrier Precautions

- Use maximum sterile barrier precautions. This involves:
 - Except for PIVC and arterial line insertions, mask, hair covering including beard if necessary, sterile gown and sterile gloves are required to be worn by all personnel involved in the procedure.
 - PIVC and arterial lines insertion require compliance with asepsis.

- The insertion site is to be covered with a large sterile drape during catheter insertion.

4.5 Skin Preparation

- Hair at the insertion site should be removed using clippers to improve adherence of the dressing.
- The skin should be physically cleaned with soap and water (if necessary) prior to applying the antiseptic solution before inserting the catheter.
- The same antimicrobial agent must be used for all phases of the patient’s skin preparation, to ensure full residual benefit and consistent action (17).
- Palpation of the insertion site should not be performed after the application of antiseptics, unless aseptic technique is maintained.
 - If the health worker needs to re-establish the identification of the vein, the site should be re-prepped with the antiseptic solution and allowed to thoroughly dry (17).

Table 3: Skin Preparation for Adults and Children ≥ 2 months (40, 41)

| | |
|--|--|
| Skin cleansing prior to PIVC insertion | 0.5-2% chlorhexidine gluconate (CHG) and 70% isopropyl alcohol |
| Skin cleansing prior to all other device insertions | 2% chlorhexidine gluconate (CHG) in 70% isopropyl alcohol |
| If there is a contraindication to chlorhexidine, povidone iodine 10% in 70% alcohol can be used as an alternative. | |

- The application of antiseptic should be a measured quantity and avoid over application. If the site is accessed prior to full evaporation of the product, this can lead to reduced efficacy.
- All solutions must be allowed to dry before beginning insertion, do not wipe or blot.
- Some of the alcoholic chlorhexidine solutions now contain colour to allow easier identification.
- Sterile saline or water solutions alone are not acceptable antiseptic solutions and should only be used to clean the skin of gross contaminants prior to applying antiseptic solution.
- Take care when applying liquid solutions to minimise the risk of eye injury to the patient due to splashes.
- Care should be taken during internal jugular approaches that solutions containing chlorhexidine are not introduced to the ear canal as this can lead to deafness.

4.5.1 Skin preparation in neonates

NSW public health organisations who care for **neonates** must have a local policy or guideline in place for skin preparation and/or antisepsis for pre-term infants. This should consider:

- Using topical antiseptics with extreme caution, particularly alcohol based preparations.
- The risk of chemical burns in premature babies.
- Avoiding Povidone Iodine for skin antisepsis.

5 POST INSERTION MANAGEMENT

5.1 General Information

- If Total Parenteral Nutrition (TPN) is being administered, where possible, health workers should utilise one lumen exclusively for that use (42, 43).
- Consider use of an extension set between an IVAD and needleless connector to reduce catheter manipulation (4).
- Refer to section [2.3 Documentation](#) for minimum documentation requirements.

5.2 Daily Review for In-patients

- All intravascular devices must be checked (table 4) at each shift for ongoing need and promptly removed when no longer required.
- The insertion site must be visually inspected by the clinician at least hourly with continuous infusion, at least every eight hours if no infusion (15). For further information refer to [Intentional Patient Rounding - Information for Clinicians and Health Professionals](#) (44). For high-risk medicine clinicians should refer to the local protocols or [Australian Injectable Drugs Handbook \(AIDH\) - 7th Edition](#) (45).
- Ensure medical staff review the need for IV therapy including antimicrobials on a daily basis and switch to oral administration as clinically appropriate.

Table 4: Daily Assessment

| Daily Assessment | | | |
|---|---|--|--|
| Phlebitis - Erythema - Tenderness - Swelling - Pain - Palpable venous cord - Purulent discharge | Systemic Infection - Rigor - Fever - Tachycardia - Hypotension - Malaise - Nausea/vomiting | Infiltration/extravasation • Insertion Site - Blanched, taut skin - Oedema - IV fluid leaking - Burning/stinging pain • Change in infusion flow | • Catheter position • Integrity of suture • Dressing integrity • Occlusion/patency • Ongoing need for line |
| <i>For PICCs & Midlines, if limb swelling is suspected, compare the mid-upper limb circumference with the initial value recorded on the CVAD Insertion Record to quantify this. If a significant increase in circumference is confirmed, venous thrombosis should be considered and investigated appropriately.</i> | | | |

(Source: I-care QLD (15, 17, 28, 36, 46-48))

5.3 Patients in the Community

- All intravascular devices should be checked (refer to table 4) at every clinical visit and removed when no longer required.
- Patients should be educated to visually inspect the insertion site when continuous infusions are running. This must include signs and symptoms of complications and who to contact if needed.

5.4 Transferring and transporting patients with CVADS

- There is an increased risk of CVAD dislodgment and falling out during transfer or transportation of patients.
- Devices should be visually inspected and secured before transfers occur.
- Consideration should be given to the weight of lumen sets and lines must be supported with additional fixation to reduce the risk of unplanned dislodgement.
- If catheter is not in use, check that the catheter is clamped prior to commencing transport.

5.5 Accessing Devices

- To reduce the risk of infection, manipulations of an intravascular device should be kept to a minimum and use a continuous flow system wherever possible.
- Where continuous flow is not possible, then the device should be flushed and locked as per local guidelines and procedures.
- The catheter lumen should be kept sterile and should never be left open to the air.
- Aseptic technique must be maintained at all times.
- Ensure line clamps are used when accessing a CVAD to reduce the risk of air embolism (22).

Table 5: Accessing Devices

| PIVC, Midline, PICC, CVC (tunnelled & non-tunnelled), Umbilical Catheters, Pulmonary Artery & Peripheral Artery Catheters, Port | |
|---|--|
| <p>Aseptic Technique Principles (49), relevant to the procedure.</p> <ul style="list-style-type: none"> • Sequencing • Hand Hygiene • Environmental control • Maintain asepsis • PPE | <p>Antiseptic</p> <ul style="list-style-type: none"> • 70% isopropyl alcohol swab OR • 0.5-2% chlorhexidine gluconate & 70% isopropyl alcohol <p>PORT/IVP with needle insertion</p> <ul style="list-style-type: none"> • 2% chlorhexidine gluconate & 70% alcohol |
| <p>Accessing a Catheter</p> <ul style="list-style-type: none"> • All intravenous access ports should be meticulously cleaned with a large wipe (scrub the hub) for at least 15 seconds generating friction by scrubbing in a twisting motion with a single-use 70% alcohol-impregnated swab or alcoholic chlorhexidine or if allergic 10% povidone-iodine and allowed to air dry prior to accessing the system (50, 51). • The catheter should be accessed with a sterile single-use device. <p>Accessing a Port</p> <ul style="list-style-type: none"> • Only a non-coring (e.g. Huber) needle should be used to access implanted ports. Safety needle is preferred. • Use a new needle for each access attempt. • Needles should be changed every seven days or more frequently for continuous infusions if necessary. • Reinsertion through the immediately preceding needle site should be avoided. | |

(Source: I-care QLD (15, 17, 28, 36, 46, 47))

5.6 Blood Collection

- Blood sampling via a CVAD is appropriate for some patient populations based on individual patient risk assessment prior to collection.
- Risks of venepuncture can include anxiety, pain, damage to skin and nearby nerves, and hematoma in patients receiving anticoagulants or with bleeding disorders (4).
- Limit drawing blood from IVADs as it increases hub manipulation and the potential for contamination (4).
- Blood samples from PIVC should not be drawn due to the risk of haemolysis, unless it is directly after insertion.
- Blood cultures should never be collected through a PIVC due to the increased rate of contamination at the time of collection.

- PICC in newborns should not be used for blood sampling or infusing blood products.

5.7 Dressings

- Use a sterile, transparent semi-permeable dressing to protect the insertion site from contamination. Allow continuous observation of the site and to stabilise and secure the device.
- For patients aged ≥ 18 years with a CVAD (CVC and PICC), chlorhexidine-impregnated dressings may be used to protect the insertion site from contamination (51, 52).
- Use of chlorhexidine impregnated dressings in infants and children may require individual risk assessment and prescription, should be considered in local guidelines (53-55).
- When the patient is diaphoretic or has excessive bleeding or oozing from the site, use sterile gauze secured with a sterile transparent, semi-permeable dressing until this is resolved (51, 56).
- Umbilical catheters do not routinely use an occlusive dressing over the insertion site, refer to local guideline or procedure for more information.
- When the patient has multiple devices, each should be dressed separately unless the puncture sites are too close together.
- All equipment used for the dressing of the insertion site must be sterile.
- Dressing must be placed so the insertion site is visible for regular inspection, therefore do not place non-sterile or opaque tape directly over the insertion site.
- All dressings must be replaced if it becomes damp, loosened, no longer adherent, soiled, there is evidence of inflammation and/or there is an accumulation of fluid.

Table 6: Dressing Change Intervals

| Dressing Type | Replacement Intervals |
|---|---|
| Transparent, semi-permeable, self-adhesive polyurethane | Every 7 days or sooner if the dressing is no longer intact, evidence of inflammation or moist |
| Gauze | Every 24 - 48 hours or whenever loose, soiled or moist |
| Chlorhexidine-impregnated | Every 7 days or at each dressing change |

(Source (13, 47, 57))

5.8 Needleless Injection Ports

- Removal of a needleless injection port must be performed using aseptic technique.
- Anytime a needleless injection port is removed from the catheter, this is to be discarded and a new sterile injection port should be attached, using appropriate aseptic technique.
- Needleless injection ports that are not bonded to the central line should be changed(17, 42):
 - At least every 7 days (coinciding with administration set changes) OR
 - At the frequency recommended by the manufacturer OR
 - If the integrity of the needleless injection port is compromised (e.g. residual blood remains within the port).

Needleless Injection Ports can also be known as: needleless IV catheter systems, swabable capless valves, swabable capless access device, needleless access ports, needle-free injection port, needleless connector and needle-free connector.

5.9 Arterial Catheters

- Replace disposable or reusable transducers at 96-hour intervals or when clinically indicated. Replace other components of the system (including the tubing, continuous-flush device, and flush solution) at the time the transducer is replaced (13).
- Keep all components of the pressure monitoring system (including calibration devices and flush solution) as a closed system (13).

5.10 Administration Sets

- IV administration sets include both the IV lines and any additional attachments such as needleless injection ports, sideline syringe infusion pumps, three-way stopcocks, multi-flow adaptors and extension tubing that may be added.
- IV administration sets must be attached to the patient so that no tension is applied to the catheter to reduce the risk of dislodgement.
- Ensure all components of the administration system are compatible (including sideline syringe infusion pump or burettes and needleless injection ports) to the devices to minimise leaks and breaks in the system.
 - All connections must be luer-lock.
- Refer to section [2.3 Documentation](#) for labelling requirements.

Disconnection of Administration Sets

- A continuous circuit should be maintained as intermittent disconnections of administration sets increases the risk of infection.
- All administration sets must be replaced;
 - After being disconnected.
 - If the catheter is changed or

- After blood has refluxed into the administration set and the blood is unable to be cleared by flushing.
- When an administration set is changed, the IV fluid bag must also be changed.

NB: infusions with blood and blood products and high value medicines, consideration may require on the continuation of the product and a risk assessment should be conducted to assess if product should be discarded and replaced with new lines or continue with existing set. Where an obvious contamination has occurred all lines must be changed.

- Disconnection of administrations sets must be avoided for routine care, such as showering, changing nightwear/gowns. If disconnected, IV lines must be replaced.
- Controlled disconnections where reconnection of the set is immediate may be appropriate in certain situations based on clinical requirements (e.g. changing IV access or infusions in operating theatres, administration of blood products or medical imaging departments).
 - For transient controlled disconnections, aseptic technique must be maintained to prevent contamination of the set.
 - If disconnection becomes more than transient or if the ends become contaminated in any way they must be discarded and replaced.

In-line Filters

In-line filters are not recommended for prevention of BSI, however certain agents such as chemotherapeutic, immunological drugs etc. require filtering for other reasons (15, 17, 46, 58).

Table 7: Frequency of Line Change

| Administration Set Use | Frequency of Change |
|---|--|
| Continuous use (NOT containing lipids, blood or blood products) | <p>Do not need to be replaced more frequently than every 96 hours unless device-specific recommendations from the manufacturer indicate otherwise (51).</p> <p>Change intermittent infusion sets without a primary infusion every 24 hours or whenever their sterility is in question (59).</p> |
| Blood and blood products | <p>Must be changed when the transfusion is complete, or every 12 hours if the transfusion is not complete (60).</p> <p>The maximum number of blood products as per the manufacturer’s recommendations has been reached.</p> <p>Any number of red cell units may be transfused during a 12-hour period, provided the flow rate remains adequate (60).</p> <p>Platelets must be transfused via a new blood administration set.</p> <p>Note: Manufacturer’s recommendations defining the maximum number of units per blood administration set must not be exceeded.</p> |
| Lipid containing solutions and parenteral nutrition | <p>Changed every 24 hours or as recommended by the manufacturer.</p> |
| Lipid containing medications (e.g. Propofol, Clevidipine) | <p>Changed at minimum every 12 hours or as per the manufacturers’ instruction (61).</p> |
| Chemotherapeutic agents | <p>Remove immediately after use.</p> <p>On completion of infusion including the line flush.</p> <p>The chemotherapy infusion episode may include more than one agent, it is common practice to utilise the same administration set, with line flush in between in order to ensure the full dose has been administered.</p> |

5.11 Flushing

- Flushing is recommended to promote and maintain patency and prevent the mixing of incompatible medical solutions. Sterile 0.9% sodium chloride for injection must be used by clinicians, unless the manufacturer recommends flushing with an alternate solution (15-17, 46, 47, 62).
- Clinicians must flush catheters immediately:
 - After placement
 - Before and after each fluid infusion or injection
 - Prior to and after drawing blood
- PIVCs must be flushed at least every 8hrs, for hospital patients or every 24 hours for patients in the community, if not on a continuous infusion.
- CVADs not being accessed must be flushed and locked every 7 days.
- Ports/IVP not being accessed must be flushed and locked every four to six weeks.

5.12 Locking

- Sterile 0.9% sodium chloride for injection should be routinely used to lock a catheter no longer required for continuous infusions, unless the manufacturer recommends catheter lumens be locked with an alternate solution (17).
 - HO's who determine a need to use alternative locking solutions (e.g. heparin, antibiotic, antimicrobial and antiseptic), must have local policy or guidelines to support the appropriate use of these solutions.
- Locks containing medication must be prescribed by a Medical Officer or Nurse Practitioner.
- Refer to NSW Health Policy, [Medication Handling in NSW Public Hospitals](#) (63).
- Catheters with a medicine 'in situ' to lock the catheter must be labelled as per NSW Health Policy, [User- applied labelling of Injectable Medicines, Fluids and Lines](#) (7).

5.13 Catheter Migration

- A catheter that has migrated externally must not be re-advanced (64). The treating medical team must be notified immediately if this has occurred.
- If a CVAD is noted to have migrated inwards from the documented marking point, the CVAD must be retracted to the original insertion measurement as documented on the insertion form (65).
 - The medical team must be notified and a risk assessment for infection/contamination should be conducted.
 - This procedure can only be done by a clinician who has achieved CVAD competency. Refer [2.1 Staff Education and Training](#) for more information.

6 REPLACEMENT AND REMOVAL

6.1 Device Duration

- All devices must be checked at each shift and removed when no longer required or if mechanical complications occur (42).
- Assess any devices in patients transferring from other healthcare facilities who may have a documented or non-documented device in situ. The clinician should inspect for infection, mechanical complications and correct distal tip position. Correct position can be determined through previous documentation and correct external lengths comparison, or via radiological confirmation.
- When adherence to aseptic technique is compromised (i.e. catheters inserted during a medical emergency, ambulance), replace the catheter as soon as possible (e.g. when the patient is stable or within 24 hours) (66-68).
- Devices should be removed based on the following clinical indications:
 - The catheter is no longer required
 - Evidence of systemic infection
 - Damaged catheter
 - Evidence of local infection (redness, swelling, oozing or pain at catheter exit site)
 - Persistent catheter occlusion
 - Confirmation of thrombosis

6.1.1 PIVC

The routine replacement of PIVC may not prevent infection or phlebitis (69, 70). Current research supports replacing a PIVC on clinical indication but the device should not be left in indefinitely and in most cases PIVC dwell time should not exceed 72-96 hours (71). A PIVC should not be used for an extended period. The need for a PIVC beyond short term vascular access should defer to a suitable long term device (refer to [section 4.2](#)). The decision to implement PIVC replacement on clinical indication must be based on a formal risk assessment.

Criteria for clinical indication based PIVC replacement

- There is good availability of staff appropriately trained in the insertion and maintenance of devices on each shift.
- There is an assurance that PIVC surveillance in the healthcare facility is adequate, including regular inspection of the site and device, and of PIVC-related *Staphylococcus aureus* bacteremia (SAB).
- There is consistent documentation regarding device insertion (site ease and date), site appearance and complications experienced with devices.
- Remove PIVC if patient develops signs of local infection, pain or tenderness and follow local reporting guidelines (e.g. IIMS)

Criteria for routine replacement of PIVC

- Replacement is likely to be uncomplicated and the risk is judged to be less than retention.
- May be appropriate in the context of high rates of PIVC related complications
- The PIVC is likely to be needed for another 24 hours.
- The decision should be document in the patient’s health record.
- PIVC replacement in neonates and children should be based on clinical indication and ongoing need for the device.

6.1.2 Midline Catheters

- Midline catheters that are inserted at the bedside using sterile technique may stay in place for 2 to 4 weeks (72).

6.1.3 Umbilical Catheters

- This will be determined by the clinical condition of the baby and availability of alternative access (73).
- Remove and do not replace the umbilical catheter if there any signs of catheter-related BSI, vascular insufficiency in the lower extremities, or thrombosis are present.
- An umbilical catheter may be replaced if it is malfunctioning, breaks or splits, and there is no other indication for catheter removal.
- Refer to local policy or guideline for further information.

6.1.4 Peripheral Arterial and Pulmonary Artery Catheters

- Do not routinely replace arterial catheters to prevent infections. Replace only when there is a clinical indication (74).

6.1.5 CVADS

- Do not routinely replace CVADs or haemodialysis catheters. Replacement should be based on clinical indication and need (51, 75).
- Do not remove CVADs on the basis of fever alone. Use clinical assessment to determine whether infection is evident elsewhere or if there is another non-infectious cause of the fever, refer [7 Diagnosis of Infection & Surveillance](#).

6.1.6 PORTS

- Ports are a long term vascular access solution.
- The life of a port is limited to the number of needle punctures. The number of punctures varies depending on the gauge of the needle used but is approximately 1000-2000 (follow manufacturers instruction) (76).
- Replace ports based on clinical indications.

6.2 CVAD Guidewire Exchange

- Guide-wire exchanges to replace catheters is not recommended. A small number of patients may benefit from this in exceptional circumstances based on patient assessment, risk and suitable environment. Not advised for haemodialysis and tunnelled catheters.
- Guidewire exchanges must not be performed in the presence of BSI (77).

6.3 Catheter Removal

- Processes must be in place to ensure appropriate authority or order/instruction and written documentation to remove devices. HOs should develop standing orders or local protocols/processes for the routine removal of PIVCs (e.g. nurse initiated PIVC removal).
- Standard precautions and aseptic technique must be used to prevent catheter site infections (4).
- Following device removal, the site must be sealed with a sterile airtight dressing until the site is healed.
 - Umbilical catheters are not routinely dressed on catheter removal, but must be clean and dry.
 - If the patient is being discharged the patient or carer should be educated on the signs and symptoms of infection and complications and advised what to do if symptoms present.
- On removal the clinician should visually check the integrity of the line.
- Routine collection of the tip is not required except in circumstances where infection is suspected. Refer section [7 Diagnosis of Infection and Surveillance](#).
- PORT/IVP and tunnelled cuffed CVADs are only to be removed by a Medical Officer or Nurse Practitioner/Clinical Nurse Consultant who has been deemed competent in this skill.
 - Ports require surgical removal in theatre or interventional radiology.

Table 8 Requirements for Removal of CVADs

Requirements for Removal of CVADs: To prevent air embolism during CVAD removal HOs must have CVAD removal detailed in their local guideline or procedure.

- Refer to [Clinical Focus Report- Central Venous Access Devices and Air Embolism \(1\)](#)
- Removal of CVAD must only be undertaken by trained or supervised clinicians. Refer to [2.2.1 Competency Assessment for CVAD](#).
- Removal of the CVAD must be undertaken using an aseptic technique that will minimise the risk of infection.
- The patient is to be positioned supine with head slightly down (if tolerated) during CVAD removal. This is to increase the pressure in the large veins to above that of atmospheric pressure, which reduces the risk of aspirating air into the venous circulation.
- Following CVAD removal, the site must be sealed with an airtight dressing which remains insitu for at least 24 hours to reduce the risk of late air embolism. Refer to [Safety Notice 004/14 Removal of Central Venous Access Devices \(CVAD\)](#). The patient must remain in the supine position (or Semi-Fowlers if supine not tolerated) for between 30 and 60 minutes following CVAD removal (78). At least one set of observations should be done during this period, as well as immediately prior to retrieving the patient to the upright position. Observe for sign of respiratory distress, assess site for bleeding or haematoma and report any changes in status immediately.
- The removal of the CVAD and the presence of an intact tip must be noted in the patient's health record.
- Following removal, the CVAD site will require daily review and dressing until healed.
- Routine observations are to be conducted after the removal of the IVAD.

6.3.1 Removal of Catheter in Suspecting Line Infection

- Do NOT remove a functioning device based solely on temperature elevation (4).
- Remove PIVC if patient develops signs of local infection, pain or tenderness(4).
- If an infection is suspected the treating medical team must be notified and an assessment made for the ongoing need of device, persisting relapse of catheter related BSI, patient deterioration and alternative IV access.
- Patients transferring from other healthcare facilities with a documented device insitu should have the device reviewed upon arrival by a clinician for infection, mechanical complications and correct distal tip position, either through previous documentation and correct external lengths comparison, or via radiological confirmation. Without documentation, consider removal.

7 DIAGNOSIS OF INFECTION AND SURVEILLANCE

7.1 Diagnosis of Infection

- For a suspected catheter related BSI (79), obtain blood cultures ([see 7.1.1](#)).
- If pus, exudate or erythema is present at the insertion site, swab the site prior to removal of the device and send for culture.
- Catheter tip cultures are not a substitute for blood cultures for the determination of a bacteraemia, a negative tip culture does not exclude infection (79, 80).

7.1.1 Blood Cultures

- Two sets (4 bottles) of blood cultures should be collected in suspected infection for each new episode. This should occur prior to commencement of antimicrobials treatment. If patient is hemodynamically unstable, take 1 set prior to commencement of antimicrobials. Do not delay the administration of antimicrobials in patients with severe sepsis or septic shock.
- Collect one set from the pre-existing device and one set from a peripheral site.
 - If a peripheral set is not possible, a blood culture set from each of 2 or more lumens is required.
- The bottle should be well filled with a minimum 10mL per bottle (for adult patients only)
 - If volume of blood to be collected is an issue, preference should be given to aerobic bottles.
 - In neonates, collect an aerobic blood culture with 0.5-1mL, refer to local policy or guideline for additional information.
- Note the collection site on the request form at the time of collection.
- For further information, refer to local policy or guideline and [Sepsis Kills Adult Blood Culture Guideline, Sepsis Kills Paediatrics Blood Culture Guidelines and Sepsis Kills Neonatal Blood Culture Guidelines](#).

7.1.2 Culturing of Tips

- Do not send catheter tips for culture on routine line removal, unless infection is suspected.
- Catheter tips should be cut using an aseptic technique.
- Ensure the site and type of catheter are noted on the request form as well as the appropriate clinical information.

7.1.3 Reporting of Catheter-related BSI

- HOs must have procedures in place for the timely reporting of all positive cultures to the treating medical and infection prevention and control teams.
- Open disclosure should be performed for all suspected or actual catheter related infections, as per the [NSW Health Open Disclosure Policy](#).

- For healthcare associated BSIs (Staphylococcus aureus and Vancomycin resistant enterococcus) HO should follow internal reporting and escalation processes and key performance indicator requirements (e.g. IIMS). The NSW health incident management process must be followed for identification, investigation and management of these incidents as SAC 2 (6).

8 LIST OF ATTACHMENTS

1. PIVC Size & Use Guide
2. Related Documents
3. Additional Resources
4. Implementation Checklist

Attachment 1: PIVC Device Selection Guide

This is a guide for PIVC device selection and should be used whenever practical. However clinical risks and patient characteristics may require a different size to be used (e.g. paediatrics and neonates).

| PIVC Size | Use |
|---|--|
| 14G | Trauma patients Rapid, large-volume replacement |
| 16G | Trauma patients Major surgery Intra-partum or post-partum GIT Bleeding Multiple line access Multiple blood transfers High volume of fluids |
| 18G | Blood products Multiple line access Large volume of fluids Major surgery Imaging requiring power injection of CT contrast |
| 20G | General use IV maintenance IV antimicrobials IV analgesia Power Injection |
| 22G | Small or Fragile veins Cytotoxic therapy |
| 24G | Small or Fragile veins Cancer services Day only infusion services Paediatrics |
| <p>Delivery of Irritant medications: Use the most appropriate cannula size for the vein as use of a peripheral intravenous cannula that is too large for the vein increases the risk of phlebitis.</p> <p>Refer Safety Notice 009/16 Avoiding thrombophlebitis with intravenous amiodarone (revised 10 Feb 2017).</p> | |

Attachment 2: Related Documents

- NHMRC, [Australian Guidelines for the Prevention and Control of Infections in Healthcare](#) (3)
- NSW Health Policy Directive, [Infection Prevention and Control Policy](#) (81)
- [Clinical Excellence Commission, Infection Prevention and Control Practice Handbook](#) (49)
- Clinical Excellence Commission, [Healthcare Associated Infection: Clinical Indicator Manual version 2.0](#) (9)
- NSW Health Policy Directive, [Medication Handling in NSW Public Health Facilities](#) (63)
- NSW Health Policy Directive, [Clinical Procedure Safety](#) (82)
- ACSQHC, [National Safety and Quality Healthcare Service Standards \(second edition\)](#) (83)
- NSW Health Policy Directive, [User-applied labelling of injectable medicines, fluids and lines](#) (7)
- ACSQHCs, [National standard for user-applied labelling of injectable medicines, fluids and lines](#) (84)
- Clinical Excellence Commission, [Clinical Focus Report- Central Venous Access Devices and Air Embolism](#) (1)
- NSW Health, [Health Care Records-Documentation and Management](#) (5)

Attachment 3: Additional Resources

- Australian Injectable Drugs Handbook (AIDH) - 7th Edition
<https://www.shpa.org.au/australian-injectable-drugs-handbook-aidh-7th-edition>
- Cancer Institute NSW, eviQ Cancer Education Online- [Central Venous Access Devices](#)
- Cancer Institute NSW, eviQ Cancer Education Online- [Clinical Resources, Central Venous Access Devices](#)
- Clinical Excellence Commission- [Training framework for clinicians new to inserting central lines in NSW](#)
- My Health learning - [Central Venous Access Devices](#)
- My Health Learning - [Invasive Device Protocols](#)
- Intensive Care NSW- [Central venous Access Device Post Insertion Management Guideline](#)
- NSW Health Multicultural Service- [Patient Information Sheets](#)
- Sepsis Kills Paediatrics Blood Culture Guidelines
http://www.cec.health.nsw.gov.au/_data/assets/pdf_file/0003/259419/paediatric-blood-culture-guideline.pdf
- [Sepsis Kills Neonatal Blood Culture Guidelines](#)
- [Safety Notice 004/14 Removal of Central Venous Access Devices \(CVAD\)](#)
- Centers for Disease Control and Prevention- [Central Line-associated Bloodstream Infections](#)
- Health Protection Surveillance Centre- [Central Vascular Catheters](#)
- Health Protection Surveillance Centre- [Peripheral Vascular Care Bundles](#)
- Health Protection Scotland- [Preventing infections when inserting and maintaining a peripheral vascular catheter \(PVC\)](#)
- The Joint Commission- [CLABSI Toolkit](#)
- Association for Professionals in Infection Control- [CLABSIs](#)

Attachment 4: Implementation Checklist

Note: This implementation planner is NOT mandatory – it is a tool for HOs to use to monitor implementation of this policy.

| LHD/ Facility: | Assessed By: | | | | Date: |
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| Implementation Requirements | Not Applicable | Not Started | Partial Compliance | Full Compliance | Action Required |
| Local guideline or procedures in place for Peripheral Intravenous Catheters (PIVC) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Local guideline or procedure in place for Midline Catheters | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Local guideline or procedure in place for Central Venous Access Devices (CVADs), including implanted venous ports (ports). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Local guideline or procedure in place for Umbilical Catheters. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Local guideline or procedure in place for Peripheral Artery Catheters. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Local guideline or procedure in place for Pulmonary Artery Catheters | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Roles and responsibilities for each type of clinician involved with these devices is clearly defined in the guideline or procedure. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Clinicians who insert, manage and remove CVADs have undergone training and formal competency assessment. Assessments are documented and accessible for review | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Facility wide monitoring of clinician CVAD insertion practices to ensure only trained/experienced clinicians undertake or supervise CVAD insertion. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| All staff involved in the insertion, management and removal of devices have completed periodic educational program and assessment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Ongoing education is provided to HWs on preventing and controlling infection risks in relation to intravascular devices. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Patients are provided with infection prevention and control education on their device and this education is documented. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

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| It has been determined where devices are to be documented in the patient health record. The CVAD Insertion Record or equivalent is completed for every CVAD insertion. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| There is an evaluation method to ensure that insertion sites are assessed and documented daily in the patient health record. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Processes are in place to support and evaluate the appropriate use of alternative locking solutions (e.g. heparin or antimicrobial). Locks containing medication are prescribed by a medical officer or nurse practitioner. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Confirmation of tip position is documented on the central venous line insertion record or equivalent for all central device insertions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| HOs who care for neonates have a local policy or guideline in place for skin preparation and/or antisepsis for pre-term infants. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Criteria for PIVC replacement based on clinical indication has been met by the HO. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Processes are in place to ensure appropriate authority to remove devices. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Procedures in place to investigate positive cultures that are attributed to devices. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| All reportable device related BSI events are reviewed at the HO on a case by case basis to identify potential opportunity for clinical practice improvement. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Surveillance systems are in place to monitor adverse events and incidents related to devices. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Compliance with this Policy Directive and Procedures is monitored and reported to the nominated peak committee. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

9 GLOSSARY

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| Administration Set | A tubing set composed of components that is used to deliver infusions. |
| Air Embolism | The presence of air in the vascular system that obstructs venous blood flow primarily to the lungs and brain (85). |
| Alcohol Based Hand Rub (ABHR) | An alcohol-containing preparation (gel, foam or liquid) designed for reducing the number of viable microorganisms on dry, unsoiled hands. |
| Alcohol Based Surgical Hand Rub (ABSHR) | Hand rub performed preoperatively by the surgical team to eliminate transient flora and reduce resident skin flora. |
| Antimicrobial | A chemical substance, usually a medicine, that inhibits or destroys bacteria, viruses fungi or protozoa (81). |
| Antiseptics | Antimicrobial substances that are applied to the skin to reduce the number of micro flora (e.g. topical alcohols, chlorhexidine and iodine). |
| Asepsis | Free from infection or infectious (pathogenic) material. |
| Aseptic Technique | Aseptic technique consists of a set of practices aimed at minimising contamination and is particularly used to protect the patient from infection during clinical procedures. The five essential principles of aseptic technique are sequencing, environmental control, hand hygiene, maintenance of aseptic fields and personal protective equipment (PPE). While the principles of aseptic technique remain constant for all procedures, the level of practice will change depending upon a standard risk assessment (81) |
| Assistant | A trained or experienced clinician who supports or aids a clinician inserting a CVAD. |
| Arteriovenous Fistula (AV) | Vascular access used to access the blood for haemodialysis treatment. |
| Blood stream infections (BSIs) | The presence of live pathogen(s) in the blood, causing an infection. |
| Catheter Exchange | Replacement of existing central venous access device (CVAD) with a new CVAD using the same catheter tract (4). |
| Central Related Blood Stream Infection (CR-BSI) | A laboratory-confirmed, primary blood stream infection in a patient with a intravascular access device in place, and the BSI is not related to an infection at another site (4) |
| Central Venous Access Device (CVAD) | A catheter introduced via a large vein into the superior vena cava or right atrium for the administration of parenteral fluids, medications or for the measurement of central venous pressure, this includes femoral venous catheters. |
| Also called a central venous line or central venous catheter (CVC). | <ul style="list-style-type: none"> Centrally- inserted central venous catheters have a skin entry point in the neck or trunk. Peripherally- inserted central catheters have a skin entry point on a limb or the scalp. Non-Tunnelled- the catheter insertion and exit points are the same Tunnelled - the catheter is inserted through one point and then “tunnelled” under the skin to a remote exit point. |
| Clinician | For the purpose of this policy, a clinician is defined as a medical practitioner (including Locum Medical Officers), nurse or midwife. |

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| | <p>Experienced Clinician- A clinician with a high level of competence in CVAD insertion and a comprehensive understanding of the management of potential complications.</p> <p>Trained Clinician- Clinician who has completed a training program consistent with best practice for the insertion of CVADs.</p> <p>Untrained Clinician- Clinician who has commenced, but not completed, a training program consistent with best practice for the insertion of CVADs.</p> |
| Competency | <p>Competence- Capability of the individual to apply knowledge, critical thinking, interpersonal, decision making, and psychomotor skills to intravascular access devices (4).</p> <p>Competence is the combination of skills, knowledge, attitudes, values and abilities that underpin effective performance (86)</p> <p>For the purpose of the guideline, a competent clinician is one who has completed a training program in the insertion of PIVCs or who is in, or has completed, a specialist medical training program</p> <p>Competency- An integration of behaviours in the varied circumstances of the work environment demonstrating the individual's ability to perform the desired job related activities and tasks (4).</p> <p>Competency Assessment- The process of reviewing and documenting the individual's demonstrated ability to perform a job, role, specific tasks, or other patient care activities (4).</p> |
| Electrocardiogram ECG | Is a test that measures and records the electrical activity of the heartbeat |
| Erythema | Redness of skin along a vein track that results from vascular irritation or capillary congestion in response to irritation, may be a precursor to or indication of phlebitis (4). |
| Extravasation | Inadvertent infiltration of vesicant solution or medication into surrounding tissue; rated by a standard tool (4). |
| Flushing | The act of moving fluids, medications, blood, and blood products out of the vascular access device into the bloodstream; used to assess and maintain patency and prevent precipitation due to solution/medication incompatibility (4). |
| Guidewire | A long, flexible metal structure, composed of tightly wound coiled wire in a variety of designs; contains safety mechanisms that allow it to be inserted into the vein or artery (4). |
| Hand Hygiene | A general term applying to processes aiming to reduce the number of microorganisms on hands. This includes application of a waterless antimicrobial agent (e.g. ABHR) to the surface of dry unsoiled hands; or use of soap / solution (plain or antimicrobial) and running water (if hands are visibly soiled), followed by patting dry with single-use towels (81) |
| Healthcare Associated Infection (HAI) | Refers to infections acquired in healthcare facilities and infections that occur as a result of healthcare interventions and which may manifest after people leave the healthcare facility (81) |
| Health Organisation | For the purpose of this Policy a Health Organisation is: Local Health District, Speciality Health Networks, Statutory health corporation that provides inpatient services, or Affiliated health organisation in respect of its recognised establishments that provide inpatient service |

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| IIMS | The NSW Health Incident Information Management System |
| Implantable Venous Port (port/IVP): | Long term CVAD, which is surgically placed under the skin from the insertion site to a separate exit site. The exit site is typically located in the chest, but can be also located elsewhere for comfort and aesthetic reasons (e.g. inner bicep, abdomen and thigh). They can be multi lumen. TIVPs consist of two main parts: the portal reservoir and a catheter. The tip of the catheter resides in either the superior or inferior vena cava. Also known as a port-a-cath or a venous port. |
| Infection | The presence and growth of a pathogenic microorganism(s) having a local or systematic effect (49). |
| Infiltration | Inadvertent administration of a non-vesicant solution or medication into surrounding tissue (4). |
| Intravascular device (device): | Catheters, tubes, or devices inserted into the vascular system, including veins, arteries, and bone marrow (4). |
| Key Parts | Key parts are those parts of equipment / instruments / consumables that if contaminated by infectious material increases the risk of infection. Contamination may occur by direct or indirect contact with the key site(s), other key-parts, or liquid infusions (81). |
| Key Sites | The area on the patient that must be protected from pathogenic microorganisms. Key Sites are medical device access sites, surgical sites or open wounds (81). |
| Locking | The instillation of a solution into an intravascular access device (device) used to maintain patency in between device use and/or reduce risk of catheter related BSI. |
| Maximum Barrier Precautions | Surgical mask, hat (head and facial hair cover), eye protection, sterile gown and sterile gloves. Equipment and clothing used to avoid exposure to pathogens, including sterile coverings for the clinicians and patient: mask, gown, protective eyewear, cap, gloves, large or full body drapes, and towels (4). |
| Midline Catheter | Catheter used in a vascular access procedure that is inserted inside a major vein for a period of weeks so that blood can be repeatedly drawn or medication and nutrients can be injected into the patient's bloodstream on regular basis |
| Monitor | To check, supervise, observe critically, or record the progress of an activity, action or system on a regular basis in order to identify change. |
| Must: | Indicates a mandatory action |
| Needleless Injection Port | A device that allows intermittent access to a device with an administration set or syringe without the use of needles (4). Also known as: Needleless IV catheter systems, Swabable capless valve, swabable capless access device, needleless access ports, needle-free injection port, needleless connector and needle-free connector. |
| Neonate | Pertaining to the first 4 weeks of life. |
| Non-tunnelled CVAD Also known as Percutaneous CVAD | Enter the venous system at the point of insertion and are fixed in place at this site, with the catheter and attachments protruding. Non-tunnelled CVADs are also known as percutaneous CVADs. Non-tunnelled catheters are generally used for short term therapy and in emergency situations. A vascular or nonvascular access device inserted by puncture directly through the skin and the intended location without a portion of the device allowed to remain in a subcutaneous tract (4). |

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| Osmolality | The number of osmotically active particles in a solution (4). |
| Palpation | Examination by application of the hands or fingers to the surface of the body in order to detect evidence of disease or abnormalities in the various organs; also used to determine location of peripheral superficial veins and their condition (4) |
| Peripheral Arterial Catheter | An arterial line inserted in radial artery; can be placed in femoral, axillary, brachial, posterior tibial arteries. |
| Peripherally Inserted Central Catheter (PICC) | A medium to long term CVAD inserted in a large peripheral vein, preferably the basilic vein, and then advanced until the tip rests in the superior vena cava or cavo-atrial junction |
| Peripheral Intravenous Cannula (PIVC): | A catheter (small, flexible tube) placed into a peripheral vein for intravenous access. |
| Personal Protective Equipment (PPE): | <p>Refers to a variety of infection prevention barriers and respirators used alone, or in combination, to protect mucous membranes, skin, and clothing from contact with recognised and unrecognised sources of infectious agents in healthcare settings.</p> <p>The equipment worn to minimize exposure to a variety of hazards, including blood-borne pathogens; examples of PPE include items such as gloves, eye protection, gown, and face mask (81) .</p> |
| Phlebitis | Inflammation of a vein; may be accompanied by pain, erythema, oedema, streak formation, and/or palpable cord (48). |
| Pulmonary Artery Catheter (PA) | Also known as a Swan-ganz catheter, is a CVAD inserted into a large central vein, with the tip residing in a pulmonary artery. Its purpose is diagnostic and therapeutic; it is used to detect heart failure or sepsis, monitor therapy, evaluate the effects of drugs, and infuse medication. |
| Should | Indicates an action that ought to be followed unless there are justifiable reasons for taking a different course of action. |
| Sterile Technique | Is a set of specific practices and procedures performed to make equipment and areas free from all microorganisms and to maintain that sterility |
| Supervisor | An experienced clinician (also refer to definition of experienced clinician). |
| Surveillance | Active, systematic, ongoing observation of the occurrence and distribution of disease within a population and of the events or conditions that increase or decrease the risk of such disease occurrence. |
| Total Parenteral Nutrition (TPN) | The intravenous provision of total nutritional needs for a patient who is unable to take appropriate amounts of food enterally; typical components include carbohydrates, proteins, and/or fats, as well as additives such as electrolytes, vitamins, and trace elements (4). |
| Tunnelled CVAD | A central vascular access device (CVAD) with a segment of the catheter lying in a subcutaneous tunnel with the presence of a cuff into which the subcutaneous tissue grows to offer security for the catheter; indicates that the skin exit site and vein entry site are separated by the subcutaneous tunnel (4) |
| Vesicant | An agent capable of causing tissue damage when it escapes from the intended vascular pathway into surrounding tissue. |
| Visual Infusion Phlebitis (VIP) score | The VIP score is used when monitoring the existence or the extent of phlebitis and is a reliable measure to determine if the catheter should be removed (48). |

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