Procedure
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Purpose

This document will outline the general procedure for all WSLHD employees involved in organising peripherally inserted central catheter (PICC) and non-tunneled central venous catheter (CVC) insertions for patients not in the intensive care or operating theatre environments at Westmead Hospital utilizing the Central Venous Access Team (CVAT). It also includes information concerning clinical competence to place central venous access devices (CVADs), insertion sites (adults only) types of CVADs, recommended dwell times, the Seldinger insertion technique, documentation, and how to reduce CLABSI.

Medical Staff are encouraged to refer to the Central Venous Access Device Insertion and Post Insertion Care PD2011_060 and the NSW Health and the Clinical Excellence Centre (CEC) Training framework for Central Line Insertion for Adults.¹ ²

The role of the CVAT clinical nurse consultant (CNC) (1 FTE job-shared position) is to ensure the centralized co-ordination of CVAD insertions throughout the hospital thus reducing the risk of CVAD related complications both during and post insertion; also ensuring that the most CVAD is selected based upon the patient’s clinical status, and the type and length of intravenous therapy required.

Intended Audience

This procedure applies to all WSLHD employees who insert, care for a patient with a CVAD, or are involved in organising a PICC/CVC insertion at Westmead Hospital.

Expected Outcomes

Safe, appropriate and timely CVAD insertion for WSLHD adult patients.

Definitions

**Antimicrobial** - A substance that is capable of destroying or inhibiting the growth of micro-organisms.

**Antiseptics** - Antimicrobial substances that are applied to the skin to reduce the number of microflora. Examples include topical alcohols, chlorhexidine and iodine.

**Assistant** - A trained or experienced clinician who supports or aids a clinician inserting a CVAD.

**Biopatch™**: is a chlorhexidine gluconate (CHG) impregnated foam dressing intended to reduce local infections, Centrally Related Blood Stream Infection (CRBSI) and skin colonisation of microorganisms commonly related to CRBSI, in patients with CVADs. Do not use directly over burn injuries or on patients with a known sensitivity to CHG.

**CAJ**: cavoatrial junction

**CALD**: Culturally and Linguistically Diverse

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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. Centrally inserted central venous catheters have a skin entry point in the neck, trunk or groin. Peripherally inserted central catheters (PICC) have a skin entry point on a limb or the scalp. Non-Tunnelled CVAD - the catheter insertion and exit points are the same. Tunnelled CVAD - the catheter is inserted through one point and then “tunnelled” under the skin to a remote exit point. CVAD are also referred to as a central venous line (CVL) or central venous catheter (CVC).

CLABSI - Central Line associated bloodstream infection

CVAT - Central venous Access Team

Clinician - For the purpose of this Policy, a clinician is defined as a medical practitioner (including Locum Medical Officers), nurse or midwife

ECG: electrocardiogram translates the heart's electrical activity into line tracings on paper. The spikes and dips in the line tracings are called waves.

Experienced clinician - A clinician with a high level of competence in CVAD insertion and a comprehensive understanding of the management of potential complications.

Escalation - An untrained clinician who fails to cannulate a vein after three passes, or causes an arterial or lung puncture, should make no further attempts at cannulation at that site and seek assistance from a more experienced proceduralist before attempting another site. The number of passes by an experienced clinician should be governed by clinical judgement (taking into account the experience of the clinician). If insertion failure occurs despite multiple passes, the clinician should consider using an alternate site, the use of ultrasound or radiological guidance or a change of proceduralist (including seeking insertion by a Radiologist or Surgeon).

FV – femoral vein

IJ - internal jugular

Insertion failure- Unsuccessful insertion of a CVAD at a particular insertion site.

Locum Medical Officer - A suitably qualified, registered and authorised medical practitioner introduced to a Public Health Organisation by a Medical Locum Agency that is listed on the [http://www.health.nsw.gov.au/business/locums/Pages/default.aspx](http://www.health.nsw.gov.au/business/locums/Pages/default.aspx), and employed in a casual or temporary capacity to provide cover for an absent member of the permanent non-specialist medical staff or when shifts are unable to be filled by overtime or casual medical employees. This document applies to all junior medical staff employed as Locums, including cover for Interns, Residents, Registrars, and Career Medical Officers ([NSW Health Policy Locum Medical Officers – Employment and Management (PD2009_051)](http://www.health.nsw.gov.au/business/locums/Pages/default.aspx)).

Maximum sterile protection - Surgical mask, hat (head and facial hair cover), eye protection, sterile gown and sterile gloves.
Medical Officer (MO) - The medical officer primarily responsible for the clinical care of the patient/client for the episode of care. The MO is responsible for ensuring that adequate standards of medical documentation are maintained for each patient/client under their care.

Multiple pass - More than one pass at the same insertion site.

Must - Indicates a mandatory action.

Pass - Each complete insertion of the needle that is intended to cannulate the central vein. This excludes passes with a small gauge seeking needle (e.g., 21g or smaller).

Seldinger Technique - Procedure to obtain access to blood vessels. The desired vessel is punctured with a needle (using ultrasound guidance where appropriate). A guidewire is advanced through the lumen of the needle which is then withdrawn. A dilator is passed over the guidewire into the vessel. The dilator is withdrawn and a catheter passed over the guidewire into the vessel. The guidewire is removed.

Should - Indicates an action that ought to be followed unless there are justifiable reasons for taking a different course of action.

SRMO – senior registered medical officer

Supervisor - An experienced clinician (also refer to definition of experienced clinician).

Trained clinician - Clinician who has completed a training program consistent with best practice for the insertion of CVADs

TPN: total parental nutrition

Untrained clinician - Clinician who has commenced, but not completed, a training program consistent with best practice for the insertion of CVADs.
**GENERAL CVC POLICY**

As soon as it is recognised that a patient will require a CVAD then an “E-Order Nurse Consult” should be placed via Power Orders with the CVAT. The earlier such a decision is made the more likely it will be that the insertion can be performed that day. If such decisions are delayed until after hours, consideration must be given to persisting with peripheral access overnight. The balance of risk lies in favor of central venous catheterisation being performed under controlled conditions during weekdays and within normal working hours.

Elective CVAD insertions are to be performed during weekdays and within normal working hours (0730hrs to 1600hrs) whenever possible. After hours, only experienced Senior Medical Officers should perform central venous catheterisation, and only in an emergency circumstances. A similar situation will prevail on weekends.

**PROCEDURE FOR DAYTIME CVAD INSERTIONS**

- It is the responsibility of the team looking after the patient to perform the CVAD insertion whether a multilumen CVC or a PICC be required, where there is a clinically competent operator.\(^1\)\(^2\)

- If the team has no clinically competent operators then place an E-Order Consult with CVAT. The Central Venous Access CNC will discuss and coordinate the alternatives discussed below.

- An Anaesthetist may provide clinical supervision or insertion of the catheter under certain circumstances but will not be involved with PICC line insertions generally. The CVAT CNC is responsible for arranging and coordinating all ward based CVAD insertions and will contact the Anaesthetic Department to organise a suitable time should teaching, supervision or assistance with CVAD placement be required. A blue booking form in these circumstances must be completed in the “red book” case log folder at the operating theatre’s reception desk.

- Where the team looking after the patient is genuinely unable to provide an operator or where it is anticipated that the procedure will be difficult, then a Medical Officer from the Anaesthetic Department may alternatively perform the CVAD insertion.

- Referral of patients on high dependency wards will take priority regarding CVAD insertions.

- It is essential that all CVAD be inserted under these conditions. Should an emergency CVAD insertion be required outside normal working hours, support from the CNC for Central Venous Access cannot be expected.
'AFTER HOURS’ CVAD INSERTIONS

- If there is no experienced RMO available, contact the Anaesthetic registrar on page 08460. **DO NOT** attempt a CVAD insertion if you are not clinically competent.

- In the case of non-emergency situations always consider a peripheral approach with a cannula until such time as a CVAD insertion may be organized. However, if a CVAD is absolutely essential and an experienced RMO is available to attend or supervise the procedure.

- Ensure that the patient’s coagulation factors and platelet counts are within normal limits (a femoral approach may be required should any of these levels be abnormal).

- Ask the nursing staff to ensure that all the equipment you will require is made available on the ward (Error! Reference source not found.).

- Collect the multilumen catheter from Intensive Care (E3a/b).

- Request an experienced senior nurse to assist you with the entire CVAD insertion.

Following the CVC insertion ensure an urgent mobile chest x-ray is performed if a jugular or subclavian line is inserted and thereafter-reviewed ASAP. Even after a failed attempt a CXR should still be done to exclude a pneumothorax.

PROCEDURE FOR DAYTIME PICC INSERTIONS

During normal working hours

The CVAT utilizes electrocardiogram ECG guided PICC placement technology allowing bedside PICC insertions and the tip confirmation to be done at the bedside. If the patient has a normal “P” wave this method is used as an alternative to chest x-ray and fluoroscopy for PICC tip confirmation. The PICC inserted is either a single, double or triple lumen power injectable PICC, which can be used for contrast media, intravenous medication and CVP monitoring. The CVAT are happy for any team members to observe the insertion of an ECG guided PICC. Please contact the CVAT CNC to organise this.
If You Need to Request a PICC Insertion You Should:

**Bedside Picc Insertion**

Log onto Cerner and place an E-order request under power orders “Consults → Nurse → Consult Central Venous Access Team”. If you have any clarifying questions then page the CVAT CNC Page 9248 (Mon - Fri 730am -3pm). Whenever possible a bedside PICC will be placed. **You need to** consent the patient (organise a professional health care interpreters to facilitate CALD³), check platelets, coagulation and INR.

**Radiology PICC Insertion**

Some patients will need to have their PICC inserted in Radiology. You **must** complete a Cerner Consult Central Venous Access Team order and the CNC will determine where the PICC will be inserted. If it is deemed more appropriate to have the PICC inserted in radiology, the CVAT CNC will contact you.

**To Book a PICC Insertion in Radiology**

Do an E-order for a PICC (to do this go to Power orders and type in “AN PICC” Ensure you clarify how many lumens you need and provide your page number on the E-Order). Some delays for PICC insertions in radiology **must** be expected due to the high demand and limited bookings. **You need to** consent the patient. Check platelets, coagulation and INR.

**Non Tunnelled CVAD**

If a PICC is not appropriate for the patient and a central venous catheter is required

1. If no team medical officer has clinical competency to insert a CVC **call the Central Venous Access CNC on page 09248**.

2. If your team has a medical officer who has a demonstrated competency in the placement of CVCs the line can be inserted by the team (see **GUIDELINES FOR THE INSERTION OF CVADS AT WESTMEAD HOSPITAL**). It is expected that most surgical registrars should be competent to perform CVCs. See **APPENDIX IV**
After Hours PICC Insertion

1. Should only be performed in an emergency.

2. If you do not have clinical competency to insert a CVC contact the Anaesthetic Registrar on page 08460.

3. If your team has a medical officer who has a demonstrated competency in the placement of PICC/CVCs the catheterisation can be performed by the team (see GUIDELINES FOR THE INSERTION OF CVADS AT WESTMEAD HOSPITAL). It is expected that most surgical registrars should be competent to perform CVCs.

4. See APPENDIX I for detailed instructions

CLINICAL COMPETENCE TO INSERT CVADs

It is the responsibility of each clinical team to determine the competence of each rotating RMO regarding PICC/CVC insertions. It is expected that the following CVAD insertion guidelines, will be followed. Westmead Hospital has adopted the “Training Framework for Clinicians New to Inserting Central Lines in NSW” as the standard for the minimum knowledge and practical training requirements for the safe insertion of central lines. See APPENDIX IV for the full document.

GUIDELINES FOR THE INSERTION OF CVADS AT WESTMEAD HOSPITAL

CVAD insertion should only be conducted:

- With adequate physical conditions, equipment, monitoring and trained assistance (see ENVIRONMENTAL, MONITORING AND EMERGENCY REQUIREMENTS)
- By trained or supervised clinicians. Untrained clinicians must not insert a CVAD without supervision of an experienced or trained clinician and must complete a training program consistent with best practice. The level of supervision required by a clinician for a particular CVAD insertion should be appropriate for the experience of the operator and the clinical condition of the patient. An escalation procedure should be in place to minimise patient harm when difficulties arise (e.g. multiple passes, complications, patient’s condition deteriorates)
Westmead Hospital – JMO CVAD insertion guidelines

- Where there is a clear indication for its use and when the benefits obtained from CVAD access outweigh the risks of insertion. CVADs should be removed as soon as practical.
- Using aseptic technique which must be applied during all CVAD insertions to reduce the risk of local or systemic infection.
- Where clinicians take steps to minimise the risks of guidewire/stiffening wire embolisation, shearing and tip damage and
- If using a dilator after it has been determined that the vessel is a vein and not an artery.

All medical staff who insert PICC/CVCs on the wards of Westmead Hospital are required to have shown clinical competency in performing this procedure:

a) Either on the basis of supervision of the procedure at Westmead Hospital as per the NSW health Training Framework.

OR

b) By exemption, therefore by the demonstration of clinical competence as a result of previous experience.

**CONSENT**

- It is imperative that the person inserting the CVAD be aware of all complications and the necessary steps to avoid these prior to inserting a line, refer to the information below for complications.
- Every line has subtle differences in insertion technique, and the product information should be read / understood prior to use. If additional wires are being used the inserter should be aware of complications specific to these.
- The patient should have explained to them the benefits and risks associated with CVAD insertion. Organise a professional health care interpreters to facilitate CALD. ³
- The person inserting the line should ideally be the person gaining consent for it, and ensuring the risks have been understood.
- It is inappropriate for a person unfamiliar with the risks of a CVAD to gain consent.
CVAD RELATED COMPLICATIONS

During Insertion

- Pneumothorax
- Haemothorax
- Malposition of catheter
- Arterial puncture (3% for IJ, 0.5% for subclavian, 6.25% for femoral)\textsuperscript{4}
- Subcutaneous haematoma
- Pain, bruising or bleeding at the insertion site afterwards
- Temporary nerve damage
- Intravascular or extravascular misplacement of guide wire / catheter
- Cardiac arrhythmia
- Reaction to contrast dye if used

Potential Long-term Complications

- Catheter related sepsis
- Catheter related thrombosis
- Catheter blockage
- Air embolism
- Catheter tip migration
- Kinking or splitting of catheter
- Cardiac tamponade
- Nerve injury
- Catheter malfunction/occlusion due to fibrin sheath formation.
- Vessel erosion/ perforation and hydrothorax \textsuperscript{1,2}

Potential Infective Complications

- Localised skin infection
- Cellulitis
- Ascending thrombophlebitis.
- Catheter related blood stream infection (CRBI) \textsuperscript{1,2}

RISK FACTORS and CONTRAINDICATIONS

The following patient factors should be considered before inserting a CVAD:

- Obesity
- Coagulopathy (platelets < 50,000/mm\textsuperscript{3}, International Normalised Ratio (INR) > 1.5, activated partial thromboplastin time (APTT) > 50 seconds)
- Patients on anti-platelet medications especially clopidogrel/ticlopidine
• Previous surgery at or near the same central vein location (e.g. lymph node dissection/removal
• Previous CVAD insertion at the same site
• Infection at the insertion site
• Presence of left bundle branch block (LBBB) on the ECG (pulmonary catheters)
• Previous or current upper extremity or subclavian thrombosis for bedside PICC insertions, whether or not ultrasound is used: PICC may be inserted in these patients under fluoroscopy

• Patients with chronic renal failure and end-stage renal disease are not appropriate candidates for PICC or subclavian CVC placement. The need to preserve peripheral veins for future dialysis fistulas is a critical issue for these patients. Insertion of any catheter in the upper extremity or the subclavian veins can cause thrombus formation and scarring that could reduce the probability for successful fistula development. The internal jugular vein, particularly the right jugular vein, is the preferred insertion site for these patients. Although this choice is not without risks, it provides the straightest and shortest route to the superior vena cava and minimizes potential venous damage

• Complications and risks inherent to each insertion site and their particular relevance in a given clinical setting e.g., pneumothorax occurring on mechanical ventilation during surgery (refer to SITES AND DURATION and TYPES AND PURPOSES OF CENTRAL VENOUS ACCESS DEVICES).
• Risks related to the transmission of blood borne pathogens, for example, human immunodeficiency virus (HIV), hepatitis B or C.
• Likely duration of CVAD placement
• Whether or not the CVAD is intended for use by the patient outside an acute care facility

**PREPARATION AND PRECAUTIONS IN NON-EMERGENCY SITUATIONS**

• Clarify the indication for the CVAD insertion, the length of therapy required and any potential problems with a senior colleague or the admitting CMO, and the Infectious Diseases team
• Check the patient’s previous chest x-rays in order to determine if they have a known:
  ➢ Anatomical
  ➢ Skeletal, or
- Vascular disease related anomaly i.e., mediastinal mass or an implantable device in situ i.e., pacemaker, defibrillator, VP shunt
  - All connections/ports attached to the CVAD should be able to be decontaminated prior to injection of fluids/drugs or aspiration of blood
  - Antibiotic prophylaxis and/or routine replacement of CVADs (i.e. weekly changes) should not be used as a means to reduce CLABSI.3
  - Tunneled CVADs have a lower rate of infection and may be more suitable when long-term (greater than 30 days) access is required.3
  - Appropriate post insertion care is vital to minimise complications. Inexperienced clinicians should be supervised when providing post insertion care and the level of supervision required by a clinician for post insertion care of a CVAD should be appropriate for that clinician.1,6

**ENVIRONMENTAL, MONITORING AND EMERGENCY REQUIREMENTS**

CVAD insertion should only be performed in areas that have:

1. Adequate lighting
2. Adequate space around the patient for ease of movement
3. Easy maintenance of aseptic technique
4. Electrical safety support
5. Immediate access to cardiac resuscitation equipment and drugs
6. Patient on a tilting bed with height adjustment
7. Skilled staff able to assist.
8. All patients must have electrocardiograph (ECG) monitoring during the procedure. If there is a reduced level of consciousness (e.g. sedation), blood pressure (BP) and pulse oximetry (SpO2) monitoring must be used. End tidal CO2 monitoring may also be of value. Supplemental oxygen must be available and administered when there is a reduced level of consciousness.

**DOCUMENTATION**

It is the responsibility of the clinician performing the PICC/CVC insertion to complete the Central Venous Line Insertion Record (SMR090.200, see APPENDIX II), which then provides a permanent record of the PICC/CVC insertion and removal in the patient’s

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progress notes. Completion of this record is mandatory following all attempts at PICC/CVC insertion, whether successful or not, regardless of the time of day or circumstances necessitating the catheter.¹

Notify the Central Venous Access Clinical Nurse Consultant (Page 09248) the next day regarding any after-hours CVC insertion, informing them if any difficulties or complications encountered during or post CVC insertion

**INDICATIONS FOR INSERTION OF PICC/CENTRAL VENOUS CATHETERS**

| • Resuscitation | • Chemotherapy |
| • Limited peripheral access | • Long term antibiotic administration |
| • Right atrial pressure measurement (CVP) | • Dialysis |
| • Inotropes | • Total parental nutrition (TPN) |
| • Pulmonary artery catheterisation | • Plasmapheresis |
| • Sclerosive intravenous medications | • Frequent blood product administration/sampling |
**INSERTION SITES AND CHOICE OF CVADs**

The choice of CVAD, site of insertion and dwell times are all governed by the guidelines stipulated in this document. Exceptions can only be made following discussion with the appropriate team Consultant. The CVAT CNC can assist in determining the optimal choice of catheter and the most appropriate site of insertion based upon individual patient’s clinical status and their IV therapy requirements.

The following should be considered when selecting a catheter:

- **Lumens:** The number of lumens, connectors and ports and the diameter of the catheter should be minimised
- **Risk of infection:** The use of antimicrobial catheters should not be standard practice for patients requiring a short-term CVAD. Coated catheters should be considered for immunosuppressed patients (e.g., burns, transplants, haematology, and mechanical cardiac or circulatory support)
- **Multiple Infusions and/or TPN:** Where multiple infusions or where TPN is being administered, a single lumen must be reserved exclusively for that purpose. Prior to commencing TPN, the lumen should not have been used for any other purpose
- **Likely duration of CVAD placement**
- **Whether or not the CVAD is intended for use outside an acute care setting facility**

### SITES AND DURATION

<table>
<thead>
<tr>
<th>SITE</th>
<th>No. LUMENS</th>
<th>DWELL TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subclavian</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrow® CVC or equivalent</td>
<td>Single lumen/multi lumen</td>
<td>If an impregnated CVC no limit unless change in patient’s clinical condition. (Non-impregnated CVC 14 days)</td>
</tr>
<tr>
<td><strong>Tunnelled</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vygon Nutricath™</td>
<td>Single lumen tunnelled CVC</td>
<td>No limit unless change in patient’s clinical condition</td>
</tr>
<tr>
<td><strong>Tunnelled</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hickman™ or Broviac</td>
<td>Single/double/triple lumen tunnelled/cuffed CVC</td>
<td>No limit unless change in patient’s clinical condition</td>
</tr>
<tr>
<td><strong>Jugular</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any catheter- short or long term</td>
<td>Single/multi-lumen</td>
<td></td>
</tr>
</tbody>
</table>
## Westmead Hospital – JMO CVAD insertion guidelines

<table>
<thead>
<tr>
<th>Any indication</th>
<th>7 days for short term CVCs. Longer for use in renal patients (Vascath®)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Femoral</strong></td>
<td></td>
</tr>
<tr>
<td>Arrow® or equivalent Vascath™</td>
<td>Double/multi-lumen</td>
</tr>
<tr>
<td><strong>Basilic</strong></td>
<td></td>
</tr>
<tr>
<td>Peripherally Inserted Central Catheters (PICCs)</td>
<td>Single/double lumen/triple</td>
</tr>
<tr>
<td>Lower SVC tip placement</td>
<td></td>
</tr>
<tr>
<td><strong>Implanted Venous Ports</strong></td>
<td>No limit unless change in patient’s clinical condition</td>
</tr>
<tr>
<td>Long-term surgically inserted central venous access devices (CVADs).</td>
<td>Single polyethylene portal/septum with a silicone catheter attached</td>
</tr>
</tbody>
</table>
# TYPES AND PURPOSES OF CENTRAL VENOUS ACCESS DEVICES

<table>
<thead>
<tr>
<th>Short Term CVADs</th>
<th>Resuscitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrow® or equivalent Multi lumen CVC (Double, Triple, Quad; Quin)</td>
<td>TPN</td>
</tr>
<tr>
<td></td>
<td>Sclerosive drugs</td>
</tr>
<tr>
<td></td>
<td>CVP monitoring</td>
</tr>
<tr>
<td></td>
<td>Antibiotics/antifungals</td>
</tr>
<tr>
<td></td>
<td>Hydration fluids and electrolytes</td>
</tr>
<tr>
<td></td>
<td>Inotropes</td>
</tr>
<tr>
<td></td>
<td>Blood products</td>
</tr>
</tbody>
</table>

**Never use a triple lumen catheter when a double CVC will suffice. The greater the number of lumens, the greater the diameter of the catheter, the greater the risk of thrombus formation and infection.**

<table>
<thead>
<tr>
<th>Intermediate – Long Term CVADs</th>
<th>IV antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripherally Inserted Central Catheters (PICCs)</td>
<td>Sclerosive drugs</td>
</tr>
<tr>
<td>Single/double lumen/triple lumen intermediate-long term CVCs inserted into an antecubital vein (preferably the Basilic vein) for approximately 10 days to 4 weeks of intravenous therapy.</td>
<td>Intermittent infusions</td>
</tr>
<tr>
<td>Power PICC also available which will tolerate a PSI 300mmHg for high-resolution scans/ rapid contrast administration.</td>
<td>TPN</td>
</tr>
<tr>
<td></td>
<td>Blood products.</td>
</tr>
<tr>
<td></td>
<td>Contrast Media (power injectable PICCS only)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tunnelled Vygon Nutricath™</th>
<th>IV antibiotics (for greater than 2 weeks of IV therapy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term single lumen tunnelled silicone CVC inserted into the subclavian or IJ by an experienced RMO (when PICC not appropriate)</td>
<td>CVAD of choice in renal patients requiring long-term antibiotic therapy (4-6 weeks) to treat conditions such as bacteraemias.</td>
</tr>
</tbody>
</table>
**NECESSARY EQUIPMENT**

The basic preparation and equipment required for CVC insertion is the same regardless of site or technique chosen. All equipment required to insert the CVAD must be sterile and immediately available, including a variety of catheters, guidewires, capless valves, sterile, drapes, syringes, needles and preparation solutions (refer to Error! Reference source not found.).

**PERSONAL PROTECTIVE EQUIPMENT (PPE)**

The clinician inserting the CVAD and assistant/supervisor (if they are entering the sterile field) must use the following maximum sterile protection equipment – surgical mask, hat (head and facial hair cover), eye protection, sterile gown and sterile gloves.

The following order for donning PPE must be followed:

- Routine hand hygiene
- Don hat
- Don surgical mask and eye protection

---

**Long Term CVADs**

<table>
<thead>
<tr>
<th>Hickman™ catheter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long term single/double/triple lumen tunnelled/cuffed CVC</td>
</tr>
<tr>
<td>CVAD of choice in acute Haematology patients.</td>
</tr>
</tbody>
</table>

| IV antibiotics |
| Chemotherapy |
| Fluids & electrolytes |
| Infusion therapies |
| Sclerosive drugs |
| Inotropes |
| Long term TPN |

**Implanted Venous Ports**

| Totally implanted vascular access devices consisting of an injection port and a silicone open-ended catheter. These devices may be surgically placed in the chest, or in the antecubital area |
| Device of choice in many Oncology patients |

| Chemotherapy (Haematology/Oncology) |
| Fluids & electrolytes |
| Long term TPN and electrolytes |
| Blood products |
| Long term venous access (e.g. Cystic Fibrosis) |
| (Some ports are power injectable i.e. for contrast media) |
Procedural hand hygiene
- Don sterile gown
- Don gloves

Other staff involved in insertion of the CVAD **must** use the following personal protective equipment – surgical mask, hat and eye protection. Additional personal protective equipment may be required (e.g. if transmission based precautions are required for the patient). All staff **must** perform hand hygiene consistent with current policy and immediately prior to putting on personal protective equipment.

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**CATHETER TIP POSITION CONFIRMATION**

The aim is to place the catheter tip in the **lower SVC/CAJ** (except for femoral CVADs in adults). Check this with care, noting the markings on the catheter. Documentation of the external length on the CVC insertion form is recommended.

Confirmation of catheter tip position is achieved by:

1. Drawback of venous blood with a syringe via each catheter lumen (if in doubt obtain a blood gas analysis)
2. Flashback of blood upon lowering of the IV flask (now attached to the central venous catheter), below heart level
3. Chest x-ray (except for femoral CVADs in adults):
   - A mobile chest x-ray marked “URGENT” is to be organized immediately (Page 09032). This film should be reviewed by the patient's primary team ASAP.
4. Image Intensifier/fluoroscope; this is used in Angiography and Operating Suites only.
5. PICC line tip confirmation can be accomplished by ECG P-wave technology at time of insertion (copy of printout to be secured in patients notes with date of procedure and patients MRN details completed), or by CXR or Image intensifier post insertion
6. For children:
If the CVAD insertion was done under a general anaesthetic then the tip position should be confirmed by x-ray or image intensifier prior to waking the child up.

If catheter needs to be adjusted, use sterile technique including full gown and gloves, full-body drape

To keep the catheter lumen(s) patent until the catheter tip is visualised on a chest x-ray either:

- Heparin lock and label each lumen
- OR
- Infuse 20mLs/hr. of normal saline via an infusion pump

**CATHETER CARE**

**Catheter Fixation**

- Appropriate securement techniques include suturing of the CVAD with monofilament non graded nylon or the use of sutureless securement devices
- The CVAD must be secured at the insertion site and also at the anchor point (if present)
- The securement of the CVAD must be assessed at least once per shift and more frequently if required
- Sutureless securement devices should be changed when the dressing is changed, or if loose or soiled
- Peripherally Inserted Central Catheters (PICC) are to be secured by sutureless fixation devices
- The weight of administration sets must be supported with additional fixation to reduce risk of unplanned dislodgement of the CVAD
When a Tunnelled Vygon Nutricath™ is inserted a short Heidelberg™ extension set is connected to the catheter hub, as these silicone catheters do not have a pre-attached clamp.

The catheter must be secured thoroughly with at least two sutures around the catheter clamp. Nothing is more dangerous than a catheter that migrates out of the vessel, or falls out due to inadequate suturing.

CVAD Dressing

- Apply the transparent semi-permeable dressing so that it is occlusive and provides additional anchorage of the catheter to the skin.\(^1\)\(^8\)

- A hydrophilic absorptive foam dressing impregnated with chlorhexidine gluconate, an example is Biopatch™, which inhibits bacterial growth under the dressing may be applied. Do not use on patients with a known sensitivity to chlorhexidine gluconate. Adverse reactions to chlorhexidine gluconate such as dermatitis, hypersensitivity and generalized allergic reactions are very rare, but if any such reactions occur, discontinue use immediately.\(^8\)

- Examine the catheter insertion site daily to monitor for infection.

REMOVAL OF THE CVAD

CVADs should be removed in normal working hours, and must only be removed by someone suitably trained and qualified to do so. If you are requesting a CVAD be removed it is important to consider the size of the catheter and the patient’s clotting times are normal. If it is a large catheter and the clotting times are abnormal you might need to correct the clotting time or delay the removal until clotting times are normal.

The catheter is removed under the following circumstances:

1. The catheter is no longer required.
2. Evidence of local infection i.e. redness, swelling, oozing at catheter exit site.
3. Evidence of systemic infection.
4. Pyrexia.
5. Leucocytosis not attributable to another source.
6. Obvious infection or abscess as a new event.

**Removal:**

- A CVAD may only be removed by trained or supervised clinicians\(^1\)
- The removal of a multilumen CVC, PICC, Drumcath or tunnelled Vygon Nutricath may be attended by a Registered Nurse who has satisfactorily completed the competency package in CVAD removal.
- Removal of a CVAD will be undertaken using an aseptic technique that will minimise the risk of infection.
- When removing a CVAD the patient should be placed in bed in a supine position. Prior to repositioning patient following removal, ensure the dressing is airtight and occlusive.
- In the non-ventilated patient, removal should occur at end inspiration or during expiration.
- Following CVAD removal, pressure with sterile gauze must be applied until haemostasis is achieved. The insertion site must be immediately sealed with an airtight occlusive dressing. This dressing is to remain intact and in situ for 48 hours to reduce the risk of late air embolism.
- Routine collection of the CVAD tip is not required. If a CRSBI is suspected the medical team may request that the tip is sent for microbiological examination and a blood culture collected from a peripheral vein within 4 hours of CVAD removal.
- Removal of the CVAD must be documented in the clinical record.
- The documentation must include:
  - Visual inspection of the integrity of the CVAD
  - If CVAD tip collected and sent to pathology
  - Condition of CVAD insertion site
- Following removal of a CVAD the condition of the site must be monitored at 24 and 48 hours at a minimum. This must be documented in the clinical record.
- All long-term tunnelled, cuffed catheters need to be surgically removed.

**INVESTIGATION OF SUSPECTED CVC INFECTION**

When notified regarding a suspected CVC related systemic/localised infection it is essential to review the patient promptly. If the patient is clinically unwell/septic and/or the CVC exit site appears obviously infected, a microbiology request form (ICP-001) should be completed. The catheter tip, exit site swab, and a set of both peripheral/central venous catheter blood cultures should then be sent ASAP for microscopy, culture and sensitivity. This must be clearly documented in the patient’s progress notes, and on the SMR090.200 Central Venous Line Insertion Record. CVC replacement should be organised ASAP.

**HEPARIN LOCKING OF CVC LUMENS**

When a lumen of a central line is not in use a Registered Nurse accredited to the Nursing CVC Register instills a “Heparin Lock” and labels the line appropriately. This should be ordered on the patient’s regular medication chart by an RMO. (See Central Venous Catheterisation – Dec 2015 DRAFT Page 23 of 21.)
Access Device – Heparinised Saline / Saline Lock For Adult Patients). When a lumen is allowed to block, the possibility of the patient developing a CVC infection is greatly increased.

**SUBCUTANEOUS HEPARIN ADMINISTRATION**

- The development of a thrombus may result in significant venous obstruction and provide a potential source of migrating septic emboli.
- It is recommended, when such catheters are placed, that patients be prescribed low-dose subcutaneous Heparin.
- Alternatively daily subcutaneous Clexane injections may be prescribed.

Catheter-related thrombosis may occur with central venous catheter usage. Predisposing factors that may potentiate thrombus development include:

- Rigidity of the catheter material
- CVC dwell time
- Size of catheter
- Underlying coagulopathies
- Repeated use of a vein
- Use of hypertonic/irritating solutions.
- Dehydration
- Obesity
- Underlying disease/condition
- Immobility

**Subcutaneous Heparin usage is obviously contraindicated in cases such as:**

- Recent/ongoing hemorrhage
- Coagulopathies, including thrombocytopenia
- Current oral/subcutaneous anticoagulant therapy
- Within 5-7 days post cerebral contusion
- Within 5-7 days post craniotomy

**ENQUIRES**

Any enquires regarding Central Venous Access should be directed to:

**Anthony Marshall** or **Fiona Stewart**

Clinical Nurse Consultants, Central Venous Access, **Page 09248**.
APPENDIX I

CVC REQUESTS MONDAY - FRIDAY

- Requesting RMO to collect/check patient's platelet & COAG levels
- Requesting RMO to place an E-order request under power orders “Consults, Nurse, Consult Central Venous Access Team”. If you have any clarifying questions then page the Central Venous Access CNC Page 9248 (Mon - Fri 730am -3pm).
- CNC (Central Venous access) to assess patient's vascular access needs.
- Arrange an appropriate time for the Anaesthetist to supervise the CVC insertion or
- Arrange for a clinically competent operator from Anaesthetics to perform the CVC insertion.
- CVAT CNC will liaise with NUM or team Leader on the ward.
- CVAT CNC will coordinate / assist with the procedure.

EARLY NOTIFICATION IS REQUIRED - MONDAY TO FRIDAY

CVC REQUESTS FOR "OUT OF HOURS", WEEKENDS & PUBLIC HOLIDAYS

a) Insert a temporary peripheral cannula.
b) Consider a temporary long line insertion by an Anaesthetist (pg. 08460) or an experienced medical officer.
c) Arrange a femoral line insertion (should only be performed by experienced medical officers out of hours).
d) Convert to elective placement of subclavian CVC next working day.

FOR ANY OF THE ABOVE, PLEASE NOTIFY THE CNC FOR CENTRAL VENOUS ACCESS ON PAGE 09248 ON THE NEXT WORKING DAY
## APPENDIX II

### CENTRAL VENOUS LINE INSERTION RECORD

**Date:** / /  
**Time:**  
**Elective:**  
**Emergency:**  
**Reowing:**  

**Patient:**  
**Consent:**  
**Time Out:**  
**Caggs:**  
**Pacemaker:**  
**ICU/HDU:**  
**OT:**  
**ED:**  
**Radiology:**  
**Other:**  
**Location:**  
**Sedation:**  
**GA:**  
**Monitoring:**  
**ECG:**  
**SpO2:**  
**BP:**  
**CC:**  

**Asepsis:**  
- Hat, mask, protective eyewear  
- Hands washed 2 min  
- Sterile gloves and gown  
- Prep. alcoholic chlohex/  
- Full sterile draping  
- Asepsis maintained throughout  

**Inserter:**  
- Right  
- Left  
- Subclavian  
- MI  
- EJ  
- Femoral  
- Basilic  
- Cephalic  
- Umbical  
- Long Saph  

**Lumen:**  
- CVC  
- PICC  
- Vascath  
- Other type / site  

**Brand:**  
**Gauging:**  
- Antiseptic  
- Antiseptic  
- Other  
**Catheter Length:**  cm  
**No. of passes:**  
**Image Int:**  
**Ultrasound:**  
**Depth inserted from skin:**  cm  

**Vascular placement confirmed:**  
- Manometry  
- Ultrasound  
- Transducer  
- Other  
**Before Diastolic:**  
**Guidewire removed intact:**  
- Independently Confirmed  
- All open lumens capped  

**Complications:**  
- N/A  
- Air Puncture  
- Haematoma  
- Pneumothorax  
- Re-position  

**Notes:**  
**PICCs only:**  
- Stiffener removed intact  
- Independently Confirmed  
**Mid-upper arm circumference:**  cm  

**Final Tip position:**  
**Confirm by:**  
**Image Int:**  
**Name:**  
**Pacer:**  

**Proceduralist:**  
**Signs:**  
**Pagers:**  
**Name:**  
**Date:**  
**Specialist / Fell / Reg / RMO / NP / RN:**  

**Assistant:**  
**Signs:**  
**Date:**  
**Specialist / Fell / Reg / RMO / NP / RN / EN / Technician:**  

**Supervisor:**  
**Signs:**  
**Pagers:**  
**Name:**  
**Date:**  
**Specialist / Fell / Reg / RMO / NP / RN:**  

**Removal:**  
**Date:**  
**Authorised by:**  
**Reason:**  
**Local sepals?**  
**Yes**  
**No**  
**Tip Cultured?**  
**Yes**  
**No**  

**GLAB Detected:**  
**Yes**  
**No**  
**If yes, date of positive blood culture:**  
**Isolate:**  

File in patient’s notes.
APPENDIX IV

Risk Rating

Procedures are developed as control measures to manage identified risks, please include the risk rating, ie. Extreme to Low. The risk rating will determine the review period for the policy ie. risks rated as Extreme and High will have a mandatory review period of 12 months. Risks rated as Medium and Low will require review within the normal 3 year period unless there is a significant change in the level of risk or compliance requirements.

Consider the risks of non-compliance with the policy which affect the organisation, patients/clients and staff.

Version History

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<td>Document Creation</td>
<td>Anthony Marshall &amp; Fiona Stewart</td>
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References and Related Documents

2 NSW Health and the Clinical Excellence Centre (CEC) Training framework for Central Line Insertion for Adults.
5 Saad TF, Vesely TM. “Venous access for patients with chronic renal failure or end-stage renal disease -- what is the role for peripherally inserted central catheters?” J Am Vascular Assoc. 2003;8:27-32.
8 NSW Agency for Clinical Innovation Central Venous Access Device – Post Insertion Management