

**Centre for Education and Training (CET),
Ballarat Health Services**



**Central Venous Access Device (CVAD)
Self-Directed Learning Package**

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An Introduction to Centre for Education and Training (CET)

Welcome to CETs Continuing Professional Development Program.

The CET is responsible for the learning and development of staff across Ballarat Health Services. This includes professional development, delivery of postgraduate programs, clinical teaching, curriculum development, continuing education, and delivery of funded programs. In addition, the CET provides regional health education to the wider Grampians region using innovative and flexible models of delivery.

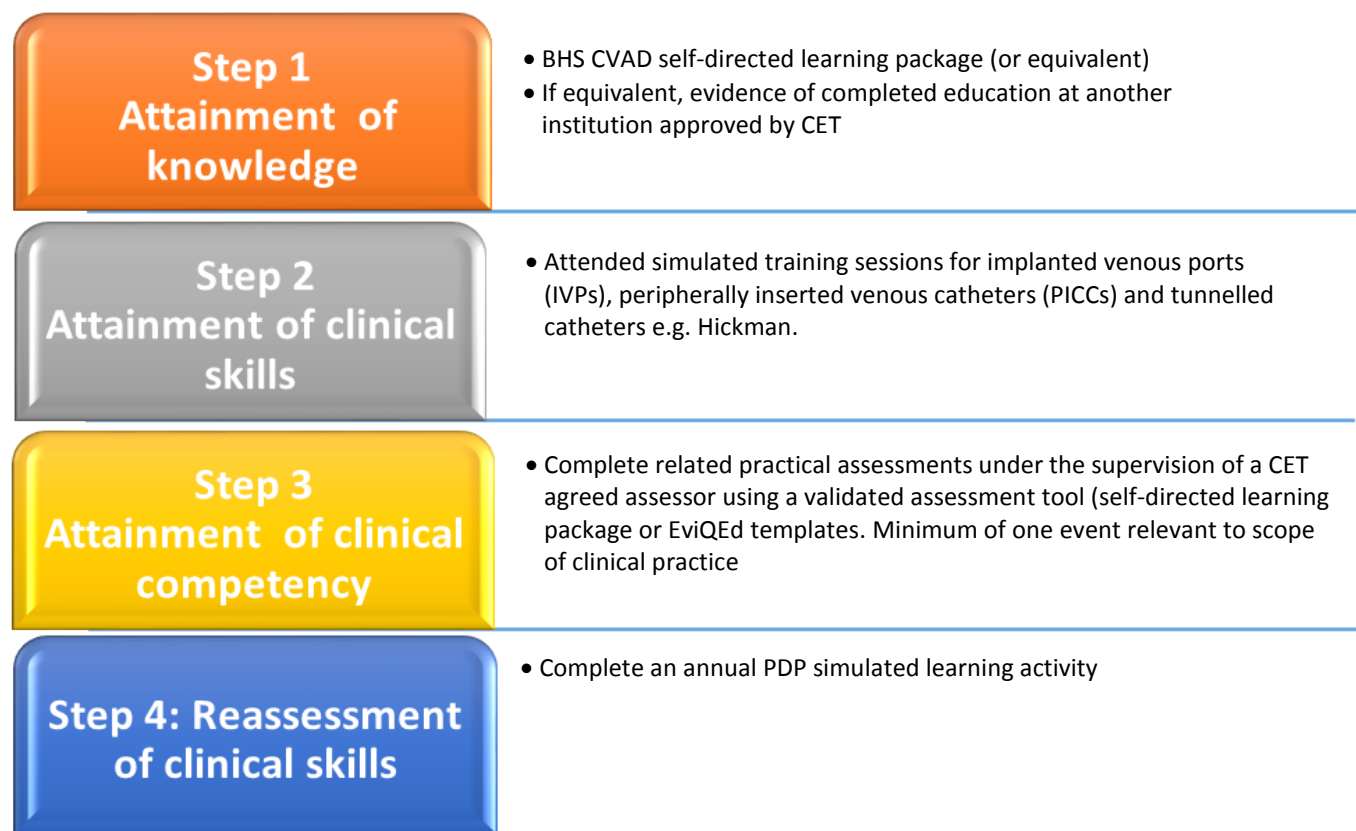
For further information, please visit our website: <http://www.bhs.org.au/node/167>

CVAD Education Framework

The use of CVADs has increased markedly over the last three decades due to research, development and refinement of CVADs, their availability and the increasing complex treatment and care needs of patients.

This means that larger numbers of the health care workforce in particular nurses, are exposed to CVADs in clinical practice. Staff require education and training to obtain the knowledge, assessment skills and technical expertise to safely manage CVADs relevant to their scope of practice.

A current model supporting CVAD education/training and attainment of competency for the Grampians region is available below based on existing resources in education delivery. The framework is proposed to complement the opportunity for attainment of knowledge at step 1 and formalise a structure for staff to attain the required clinical skills (at step 2 & 3), to safely manage CVADs relevant to their scope of practice. Step 4 offers an outline of continued skills assessment to ensure safe clinical practice.



Aim of the self-directed learning package

The aim of the self-directed learning package is to provide you with the opportunity to explore and examine the foundations of knowledge, skills, and attitudes surrounding the management of CVADs in the clinical setting. What you learn from completing this learning package is aimed at being practical and relevant, and will assist you to improve the quality outcomes for patients and their families receiving care.

Content

Regardless of your previous experience, it is anticipated that the CVAD self-directed learning package will provide a systematic guide to enhancing your knowledge in CVAD management. The self-directed learning package is delivered by mixed mode, meaning it combines different styles of teaching strategies, is flexible and allows you to complete sections relevant to your clinical scope of practice.

Self-directed learning package – what you need to know

The self-directed learning package has been designed to assist you to integrate theoretical knowledge into your nursing practice. As this learning package is structured around principles of adult learning, you are required to become actively involved in your own learning as well as (within the context of the learning objectives) being creative in initiating and seizing learning opportunities in the clinical environment.

Reference to resources attached to the eviQ website will be made throughout this learning package, which can be accessed by going to the main eviQ web address: <https://www.eviq.org.au/>

Adult learning – basic principles

The design of the CVAD learning package provides you with an opportunity to make considerable choices about when you learn, the resources you use and the amount of time you need to devote to a particular topic. This flexibility reflects basic tenets of adult learning theory, which are that adult learners know how and when they best learn, and are able to recognize what is relevant to their learning needs at a particular time. Another principle of adult learning is that adult learners are both self-motivated and self-directed. On this basis, it is up to you to choose how long you spend in each topic, whether you complete the clinical activities and the assessment tasks. It is an expectation of the flexible mode learning modules that you will be:

- Self-organising
- Keen to read widely and consult clinical experts on relevant topics
- An initiator of your own learning

Assessments

Participants are invited to complete a quiz at the end of the learning package to test their knowledge and clarify any areas where knowledge gaps are identified prior to assessment of clinical skills.

The eviQ CVAD suite of assessment tools will be applied to assess competency of staff following completion of this self-directed learning package. Participants will need to demonstrate clinical competency in CVADs relevant to scope of practice based on the framework outlined on page 3.

Exclusions:

CVADs used for short-term use in the ICU setting will not be discussed in this package.

Learning Objectives:

- Define what a CVAD is
- Identify common insertion sites and common characteristics of a CVAD e.g. catheter types, composition, tip and lumen configuration and size
- Identify what CVADs are used in the oncology setting and understand their indications for use
- Understand key principles of CVAD care and how to manage CVADs relevant to clinical scope of practice

- Identify common complications associated with CVADs and how to manage them

Learning Package Components

Materials for this package are presented in three sections in PDF format.

1. The CVAD self-directed learning package (you are reading this now)
2. Appendix 1: CVAD care pathway
3. Appendix 2: Quiz

The content of this self-learning package is designed to systematically introduce you to the concepts and principles relevant to the management of CVADs. In addition to this, learning activities have been integrated throughout the learning package to facilitate your understanding of the management of CVADs.

Key to Activity Icons



Computer Activity:

Requires you to go online to investigate issues further



Reflection Activity:

Reflect on your own practice and/or understanding before continuing further.



Further Reading:

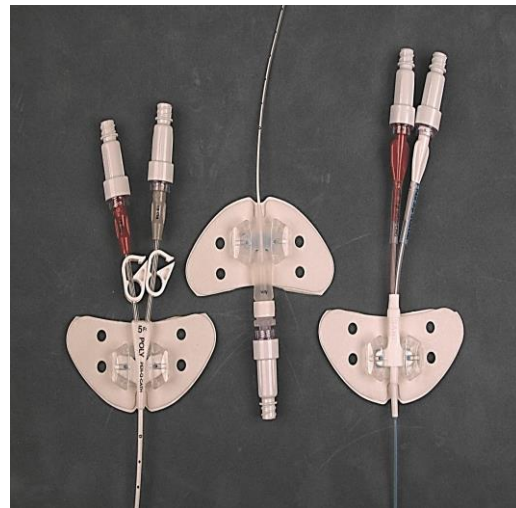
If you would like to expand your knowledge, further reading is available.

An introduction to CVADs

FIGURE 1: IMPLANTED VENOUS PORT (IVP)



**FIGURE 2:
TUNNELLED CATHETER**



**FIGURE 3: PERIPHERALLY INSERTED CENTRAL
VENOUS CATHETER (PICC)**

What is a CVAD?

CVADs are devices used to gain access to the central circulation. Although there are numerous venous access devices available, all CVADs are alike in that they are positioned within the central venous circulation, typically in the superior vena cava (SVC), with the tip positioned in the lower third of the SVC.

This tip location allows the catheter to float freely within the vein lumen and lie parallel to the vessel wall, resulting in a reduction in complications such as thrombus and infection. The carina is used as a landmark in central venous catheter placement. When viewing a chest X-ray the catheter tip should be positioned approximately at the fourth anterior intercostal space.

Figure 4:
CVAD catheter tip placement

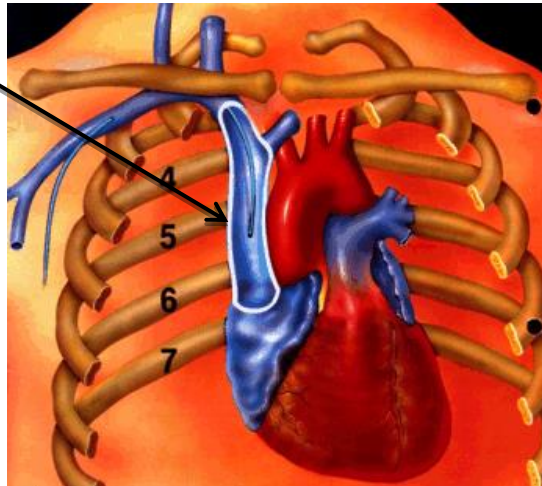
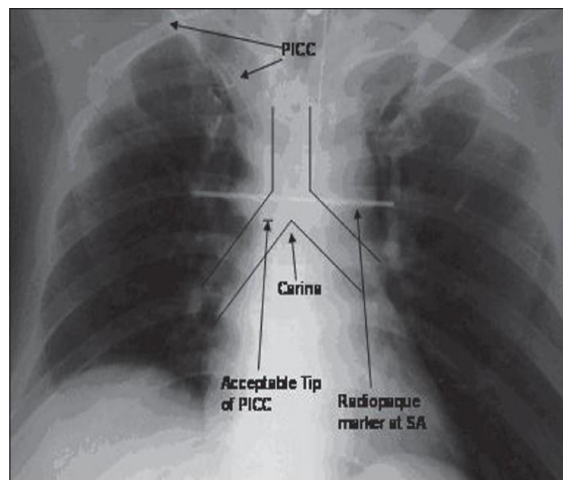


Figure 5:
Correct placement confirmation by plain chest x-ray



What is the carina? Click here to find out

<https://www.cancer.gov/publications/dictionaries/cancer-terms/def/carina-of-trachea>

CVADS used in the clinical setting

In general, there are three types of CVADs used in at BHS to manage chronic conditions (such as cancer and related treatment, malabsorption/metabolic syndromes and chronic infections).

These are:

- Internal Devices, Implanted Venous PORTs (IVPs)
- External Devices:
 - Tunnelled catheters
 - Non-tunnelled catheters, PICCs



Click on the following link to the eviQ website to view the types of CVADs available and their advantages/disadvantages for use in clinical practice.

<https://www.eviq.org.au/Protocol/tabid/66/categoryid/432/id/191/Supporting+Document+--+Central+Venous+Access+Device+Line+Selection.aspx>

You will see there are numerous catheters available and it is important to know which ones you are looking after. For example, Power Injection Catheters are available which can be used for CT contrast injections. However, standard CVADs cannot be used for this purpose.

Indications for use

- When the client has poor peripheral vascular access
- Patients with intermittent or long-term therapy (limiting the number of venipunctures and protecting the peripheral vasculature)
- Administration of medication – vesicant or continuous chemotherapy (providing a secure method of drug delivery)
- Immediate venous access in an emergency situation
- Apheresis procedures – cell collection

Catheter Selection

The following factors are 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 short term CVADs. Coated catheters maybe considered for immunosuppressed patients
- Multiple infusions and / or total parental nutrition (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 must not be 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 or patient preference based on lifestyle/work issues

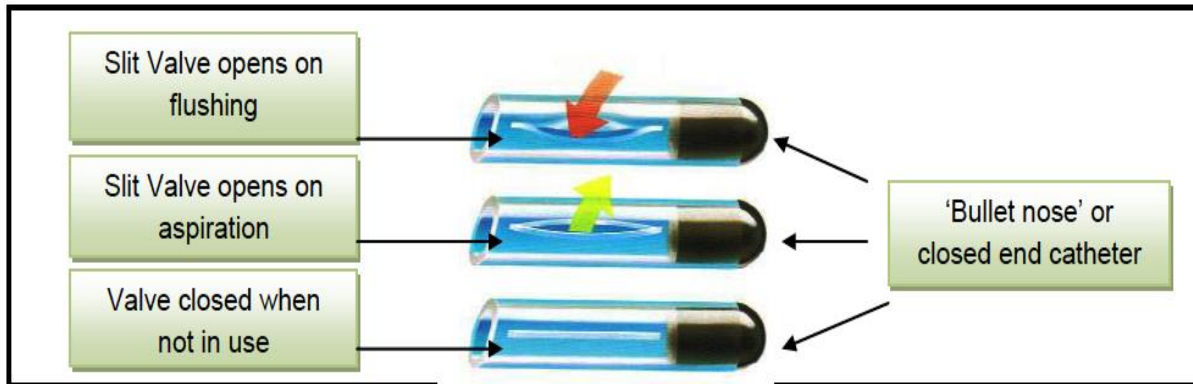
Common Characteristics of CVADs

Catheters used can be valved or non-valved:

Valved:

Valved catheters (e.g. Groshong[®]) allow the infusion of solutions and aspiration of blood but when not in use remain in a closed position preventing reflux of blood into the catheter. Valved catheters do not require clamping, heparin locking, and the catheter tip cannot be trimmed at insertion to fit the patient's anatomy.

Figure 6: Valved catheter



Newer catheters have the valve designed in the distal end of the catheter, allowing the proximal end of the catheter (at the SVC) to be trimmed to fit the patient's anatomy e.g. Power PICC Solo & BioFlo PICC.

Non-valved:

These catheters are open-ended, do not have a valve and require clamping and positive pressure locking. The catheter tip can be trimmed at the end to fit the patient's anatomy

Figure 7: Non-valved catheter – open-ended

(A)



(B)



- Most long term catheters are made from silicone or polyurethane
- Single, multiple lumens (with or without staggered tips) are available allowing for multiple infusions of fluids or drugs. Staggered tip catheters cannot be trimmed at the end
- External device multiple lumens usually have different coloured hubs to assist identification and labelling of the lumen. For example double-lumen Hickman catheter usually has a red lumen designated as 'arterial' and a blue lumen designated as 'venous'. This is based on the function of the catheter if used in dialysis or apheresis procedures.
- The catheter circumference is measured in 'French Gauge' with the catheter lumens measured in 'gauge'. Gauge sizes vary with the smaller number indicating the larger size lumen. Figure 5 offers a guide to equivalent sizes between gauge and French size.

Figure 8:

Equivalent Gauge and French sizes of vascular access devices	
Gauge (G)	French (Fr)
23g	2.0fr
20g	3.0fr
18g	4.0fr
16g	5.0fr
11g	9.0fr
10g	10.0fr
7g	13.0fr



The Cancer Nurses Society (CNSA) 2007, has further information on CVADs including indications for use, general characteristics and an example of an algorithm for CVAD selection. To find out more go to:
<https://www.yumpu.com/en/document/view/6079963/cvad-guidelines-summary-cancer-nurses-society-of-australia>

Medical apps (e.g. Michigan MAGIC) are also available to assist with appropriate device selection. For more information go to
<https://annals.org/aim/fullarticle/2436759/michigan-appropriateness-guide-intravenous-catheters-magic-results-from-multispecialty-panel>

Key Principles of Care

1. Confirmation of placement

CVAD insertion is a complex procedure that has the potential for immediate as well as delayed complications.

CVAD insertion is performed in a variety of clinical settings including cardiac and interventional radiology suites and inpatient wards by a variety of clinicians including surgeons, radiologists and nurses.

After insertion, a chest x-ray is required to confirm the tip is in the correct position (alternatively, ECG readings can be used by observing the P waveform which can be particularly helpful when inserting IVPs to ensure the catheter has not been inserted too deep). The tip of a CVAD should lie in the SVC outside the right atrium in order to prevent arrhythmias or atrial perforation. Pneumothorax should also be excluded for neck or subclavian line insertions.

Catheter tip placement must be confirmed before use and documented in the patients' medical record.

The CVAD tip should be:

- In the SVC
- Above the cephalic limit of the pericardial reflection
- At the level corresponding to the carina on the chest radiograph

For PICCs, the external length of the catheter should be documented in the patients' medical record. Additionally, the total length of catheter inserted should be documented in the event the catheter requires removal (particularly where the catheter tip has been trimmed).

2. Cleaning Agent

A 2% chlorhexidine gluconate in 70% isopropyl should be used to clean the area or povidone iodine in alcohol if the patient is sensitive to chlorhexidine. Use a back and forth motion using gentle friction when using chlorhexidine gluconate and 70% isopropyl to clean site.

Note: Gentle friction against the skin is required with isopropyl alcohol 70% to trigger its bactericidal effect through the denaturation of proteins. EviQ guidelines recommend this be done for 60 seconds at the insertion site. Otherwise, refer to your local hospital policy or Infection Control Department.

3. Dressing Materials

Dressings applied to CVADs should be according to hospital policy. In general:

- A transparent semi permeable membrane (TSM) e.g. IV Opsite 3000® is used for PORTs. If the patient is sensitive to a TSM dressing a sterile gauze and either self-adhesive polyurethane e.g. tegaderm or non-woven fabric dressing e.g. Mefix® can be used. Some form of chlorhexidine dressing is recommended for external catheters e.g. Bio Patch or CHG Chlorhexidine Gluconate Securement Dressing
- Dressings should not be submerged under water. Showering is possible if the CVAD and dressing is made water proof with a cover

Frequency of dressing change:

- All dressings should be changed if not completely intact, dry and clean
- The initial dressing should be changed at 24 to 48 hours post insertion (however if the dressing is intact, leave until the next scheduled dressing date)
- TSM dressings every 7 days – combine with cap/line change where possible
- Gauze dressing covered with either TSM or a nonwoven fabric every 48 hours



There are a number of dressings available to secure external central catheters. Whatever your health service uses, it is important to understand how to manage these dressings appropriately to maximise catheter securement and prevent medical adhesive-related skin injuries (MARSIs) e.g. moistening the dressing for removal. To find out more go to <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5417573/>

4. Access

Always ensure patency of the catheter by blood return before flushing any fluids/medications.

Note: Flushing the contents of the catheter into the patient's circulation should be avoided (at initial access), as this may cause a septic shower.

A septic shower is the sudden systemic influx of pathogens that have colonized in an inserted device triggered by the infusion of fluids into the device causing septic shock in the patient. This is a life threatening condition and requires urgent medical attention. Attempts should be made to aspirate and discard approximately 3mls- 5mls blood from all inserted devices when they are first accessed and after any prolonged periods of non-use e.g. prior to daily medications to avoid this adverse event.

4. Syringe size

Only use lure lock syringes 10 mL for all CVADs when administering medications, withdrawing blood and flushing. Smaller sized syringes increase the pressure in the catheter wall and increase the risk of damage and catheter rupture.

5. Blood sampling

CVADs can be used to collect blood for sampling in situations where peripheral samples are difficult to obtain. It is important to stop all infusions if in use and do not disconnect the line. Collect bloods by going up the line to the next side port or use a 3-way tap.

The first 3-5mls of blood should be discarded unless it is required for blood cultures. Following collection, flush the catheter thoroughly with 20mls normal saline using a pulsating technique (see principle 8).

6. Line changes

Lines attached to all CVADs should be changed according to organisational policy. There will be variation in the frequency of line change according to the type of fluid administered. Lines should therefore be labelled with dated adhesive labels documenting date of required line change.

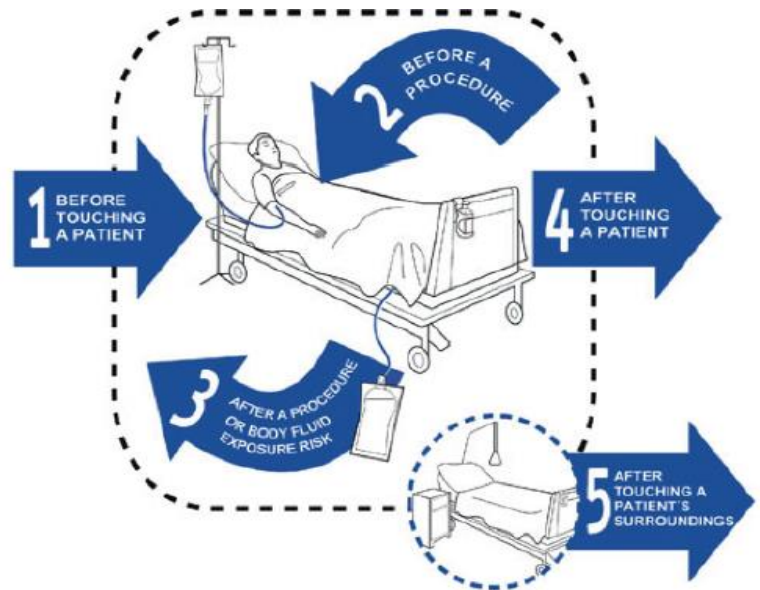
Keep vein open (KVO) volume: There are no evidence-based guidelines on how much fluid should be infused to keep a catheter patent. The Infusion Nurses Society indicate that "a standard infusion rate, a so-called one size fits all, cannot be determined and needs to take into account the age of the patient, fluid and electrolyte balance, and the presence of comorbidities." Alliance for Vascular Access Teaching and Research (AVTAR Group), (2019). FAQ. Retrieved from <http://www.avatargroup.org.au/faqs.html>

7. Aseptic technique when handling CVADs

Note: Careful attention to aseptic technique is essential to CVAD care.

- Staff must adhere to the 5 moments of hand hygiene and use an aseptic non-touch technique (ANNT), when caring for a CVAD

Figure 9: Five moments of hand hygiene.



Aseptic Non-touch Technique (ANNT) defined:

ANNT is used to prevent contamination of key parts and key sites by microorganisms that could cause infection. In ANNT, asepsis is ensured by identifying and then protecting key parts and key sites by hand hygiene, non-touch technique, using new sterilised equipment and/or cleaning existing key parts to a standard that renders them aseptic prior to use

- Frequent connection and disconnection of lines e.g. for bathing/showering must be avoided (to minimize the risk of catheter-related blood stream infections and catheter occlusion). If a line is disconnected for any reason, a new administration line must be established.



Passive Disinfection Devices are also available to place on the end of a needleless connector to disinfect and protect the end from contamination e.g. CUROS. For more information go to: https://www.3m.com.au/3M/en_AU/company-au/all-3m-products/~/Curos-Disinfecting-Caps-CFF10-250R/?N=5002385+3291662407&rt=rud

8. Flushing of CVADs



Flushing

- CVADs should be flushed with 10mls - 20mls normal saline using a manual pulsating action with 2 x 10ml lure lock syringes. This action creates turbulence in the catheter lumen to remove debris and reduce the occurrence of intraluminal occlusion.
- All CVADs should be flushed before and after administration of any substance (fluids, medications, blood products) and with locking the device. Never use excessive force.
- Ensure CVADs with multiple lumens are checked for patency, flushed and locked according to local hospital policy

Locking

- Valved catheters do not require clamping and heparin locking
- Open-ended catheters do not have a valve and require clamping and positive pressure locking. The need to lock the device using the positive pressure technique will depend on the type of needleless injection cap used. The table below provides further information on common needleless injection caps and their care.

Figure 10: Common needleless injection caps and their care

Description	Example
<p>Neutral needleless injection cap does not have a mechanical valve to displace fluid when disconnected from a syringe. Some use an internal valve to reduce reflux when not in use.</p> <p>A neutral needleless injection cap requires clamping using a positive pressure technique (i.e. the catheter clamp is closed when instilling the last 0.5ml of fluid)</p>	 <p>The Neutron by ICU Medical is a common neutral needleless injection cap used in the Grampians region.</p>
<p>Positive needleless injection cap use a mechanical valve to create positive pressure of fluid movement from a reservoir into the lumen of the catheter upon disconnection of the syringe. Clamping the non-valved catheter occurs following disconnection of the syringe (approx. 3 sec following disconnection)</p>	 <p>The MaxPlus™ clear needleless connector is a common positive needleless injection cap used in the Grampians region</p>

Note: It is recommended to clamp catheters when not in use to reduce the chance of bleeding or an air embolism in the patient in the event the needleless injection cap is accidentally removed or falls off.

Use of Heparin to lock CVADs

There is insufficient evidence to inform the appropriate CVAD locking solution and frequency.

The Cancer Nurses Society of Australia (CNSA) recommends the following:

- Heparin should be used when necessary for non-valved catheters in the lowest concentration (commonly 50IU heparin in 5mLs sodium chloride 0.9%). Cancer Institute NSW, (2015). Supporting Document - Central Venous Access Device. EviQ (2015). Retrieved from <https://www.eviq.org.au/Protocol/tabid/66/categoryid/432/id/112/Supporting+Document+-+Central+Venous+Access+Device+.aspx>
- Conversely, a 2014 Cochrane Database Review showed no conclusive evidence of reduce thrombolytic occlusions when heparin intermittent flushing was compared with 0.9% normal saline flushing for central venous catheter maintenance – For further information refer to ‘Heparin versus 0.9% sodium chloride intermittent flushing for prevention of occlusion in central venous catheters in adults’ <https://www.ncbi.nlm.nih.gov/pubmed/25300172>
- Refer to your organisational policy on the use of heparin (including dosage used), when locking a CVAD



Does your local CVAD hospital policies cover the key principles of care? What is included and is there anything missing? Where can you raise any concerns you have about the link to evidence in your organisational policy?

9. Assessment and documentation

The condition of the CVAD and all care provided should be documented in the patients nursing notes and/or care pathway as per hospital policy, see appendix 1 for an example of a CVAD care pathway.

The following elements can be used as a guide:

- 'Ready for use' documented when the device is being accessed for the first time following insertion
- Integrity of CVAD site
 - Any swelling, redness, pain or discharge
 - Blood return and patency of the device
 - Condition of dressing and securement device (if relevant)
 - Catheter measurement (if relevant)
- Equipment used and solutions
- Any interventions used to obtain patency (troubleshooting)
- Labelling of administration sets and infusion therapies using approved labels

10. Patient education

Patients and their carers/family need to be provided with information on why they require a CVAD, any care requirements at home, what the possible complications are and when to seek medical assistance.

Patients should be supplied with any printed or media information available and must be given the opportunity to ask questions.

The following themes can be used as a guide when educating patients and their carers/family about CVADS:

- Which CVAD they will have inserted
- How the CVAD is accessed and any care while accessed
- Any complications that may arise and what to look out for e.g.
 - for signs of infection - pain, redness, swelling, discharge or leakage of fluid
 - palpation the site on top of the dressing for any tenderness
- What to do in the event that the CVAD or access line ruptures or begins to leak
- Details of appropriate and readily accessible 24-hour medical and nursing contact to which patients can direct queries.

INTERNAL DEVICE: IVP

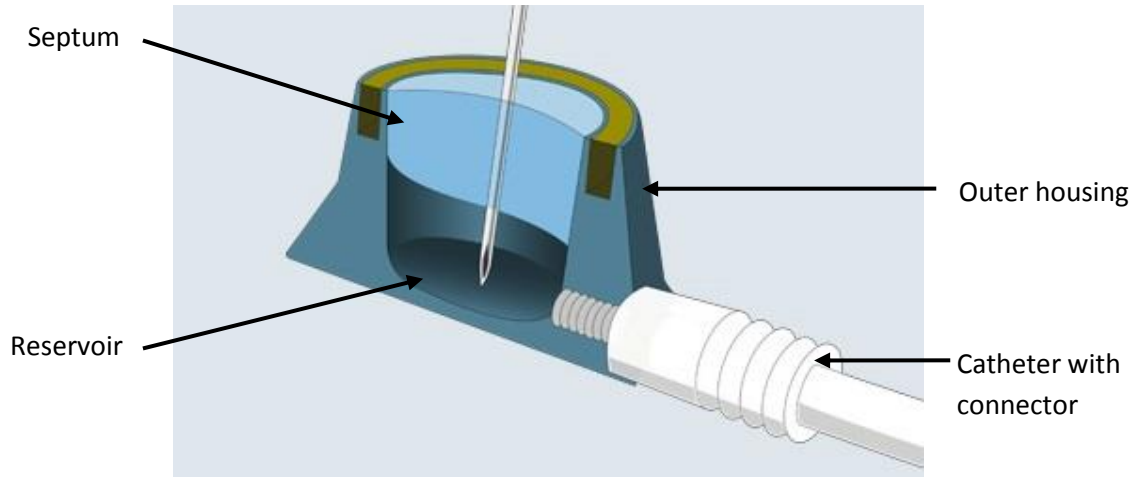
Figure 1:



An IVP is known by several other names including infusaport, portacath or just a PORT. It consists of:

- An outer housing with a silicone septum and reservoir
- A radiopaque silicone or polyurethane catheter
- Catheter connector

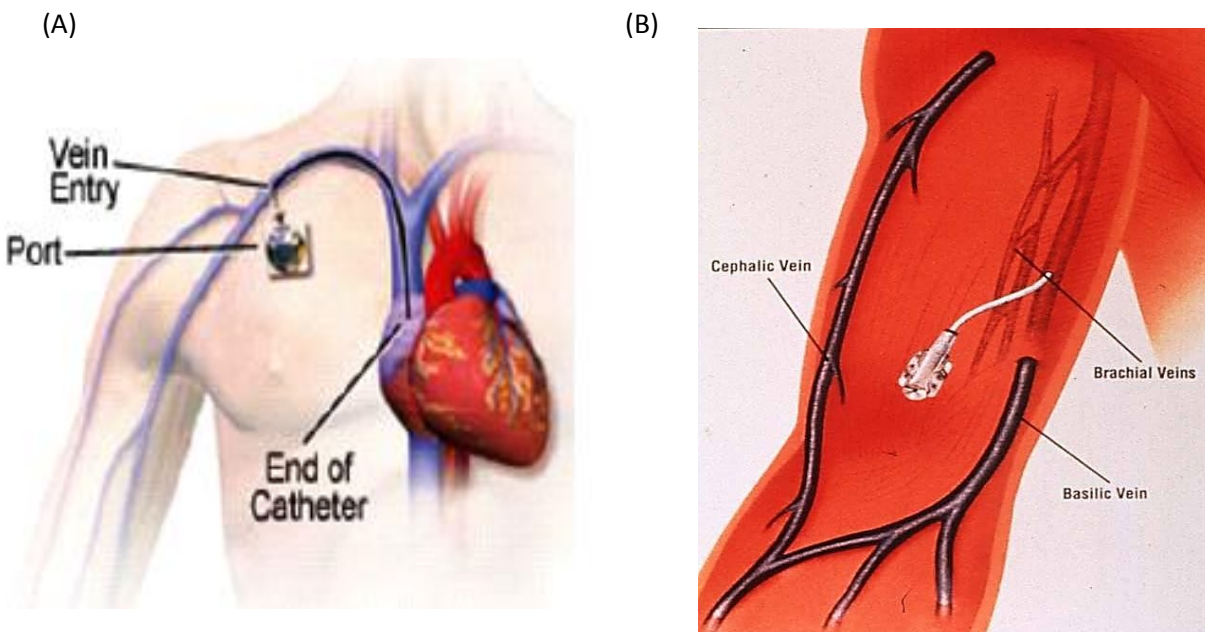
Figure 11: Components of an IVP



The outer housing is usually made of inert material such as plastic, stainless steel or titanium. The septum has a self-sealing silicone centre with a space or reservoir underneath for access to the circulatory system. The septum serves several functions including allowing an access needle to enter, holding the needle in place thereby stabilising it during infusion therapy, and resealing once the access needle is removed. Most IVPs are designed for multiple puncture (up to 1000 to 2000 punctures with a non- coring needle).

As the name suggests IVPs are surgically inserted under the skin (subcutaneous pocket) in the chest or upper arm. Catheter access to the circulatory system will depend upon the insertion site. In general, a chest IVP will be accessed via the subclavian vein while an upper arm IVP will be accessed via the basilic or brachial vein.

Figure 12: Diagram illustrating IVP chest and arm placement





There are numerous IVPs available in clinical practice and it is important to know which ones you are looking after.

Do you know which IVPs you see in clinical practice? If not where would you be able to find this information?

Pre and post insertion care

A full blood examination and coagulation profile may be required prior to insertion of an IVP. Post insertion care is required until the incision site has healed. Keep the site dry and covered until any sutures present are removed (if not dissolvable) and protect the area from getting wet when showering or bathing. Also, note that some inserters may use glue to close surgical wounds

Check your local hospital policy on the care of an IVP post insertion. However, the following can be used as a guide where this information is not available.

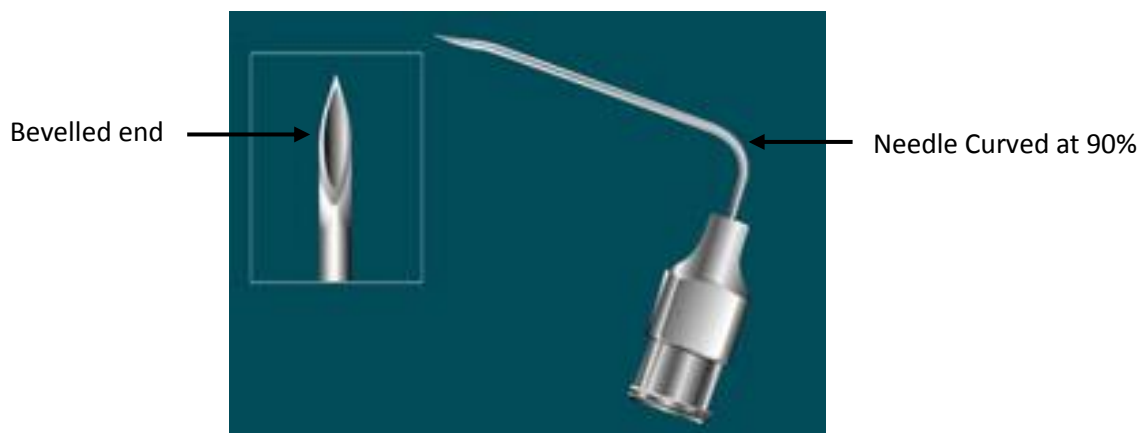
- All dressings should be changed if not completely intact, dry and clean
- The primary dressing should be changed at 24 - 48hours.
- Frequency of dressing change will depend upon the type of dressing material used.
 - A gauze dressing covered with either TSM or a nonwoven fabric will need to be changed every 48hours
 - A TSM dressings every 7 days
- The site can be left open when completely healed

Special Considerations - IVP Access

All IVPs require access with a non-coring Huber needle. A non-coring Huber needle is designed with a deflected or offset 'B' bevel point. This tip has the advantage of parting rather than cutting a plug from, or coring, the silicone septum of an IVP.

Non-coring Huber needles can be straight or curved (at a 90° angle). Curved non-coring Huber needles are used in the clinical setting for short or long-term infusions for stabilisation and for patient comfort, as it lies flat against the patient's skin. There are various non-coring Huber needles available on the market, which come in numerous length and gauge sizes. How deep the IVP is in the subcutaneous tissue will determine the length of non-coring needle required - see page 20. It is recommended that those with safety features to reduce needle stick injuries are used to reduce the risk of needle stick injury.

Figure13: Characteristics of a non-coring Huber needle





As with IVPs it is important to know what non-coring Huber needles you use in clinical practice as they may vary; particularly in the safety features offered.

Do you know which non-coring needles you see in clinical practice and how to use them?

Principles for accessing an IVP

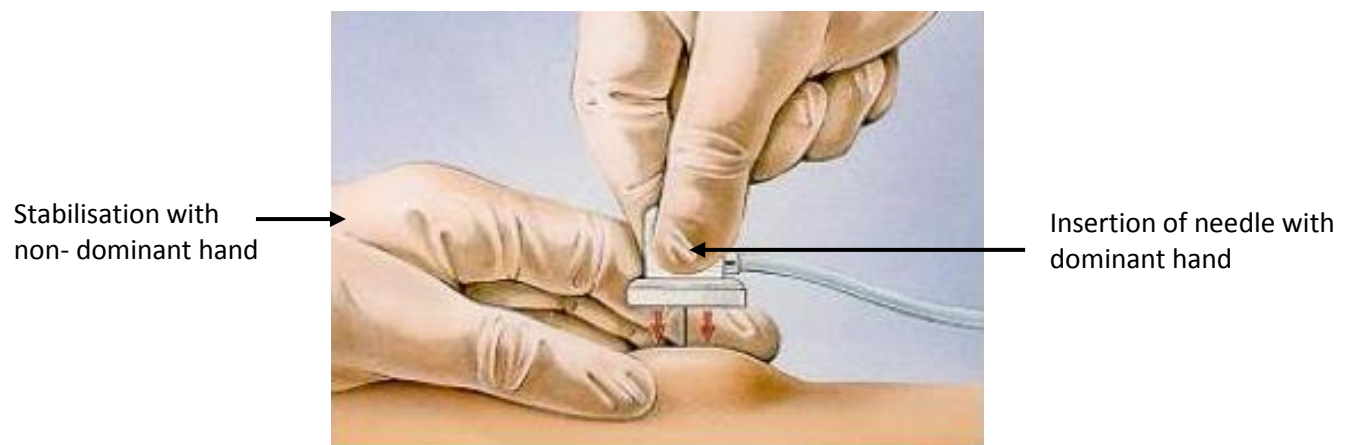
The following principles should be applied when accessing an IVP with a non-coring Huber needle:

- Look and touch – assess the IVP area for any sign of infection or occlusion (swelling, redness, or exudate) and palpate the IVP to identify the septum
- Ascertain what length needle you will require. This is determined by how deep the IVP is implanted the subcutaneous tissue. It is important to ensure that the correct length is used i.e. if the needle is too long, it may result in patient discomfort or, if it is too short, it may not reach the PORT reservoir.

A general guide used in clinical practice is:

- A ½ inch needle is for an arm IVP
- A ¾ to 1 inch needle for a chest IVP
- Remember that this can change in situations where the patient gains or losses weight.
- Hold the needle in the dominate hand and stabilise the port between the index finger and middle finger of the non- dominant hand
- Insert the non-coring needle firmly through the skin over the port at a 90° angle and push gently until the tip of the needle touches the bottom of the portal chamber

Figure 14: Insertion of a non-coring Huber needle



- If an infusion is to be administered, the needle must be stabilised with a dressing. Protect the site from getting wet when showering or bathing
- The maximum indwell time for a needle is generally 7 days

Note: Topical medications are available (e.g. EMLA patches impregnated with lignocaine and prilocaine), to reduce the discomfort associated with needle insertion. EMLA patches need to be applied at least 60 minutes prior to the procedure.

Removal of an IVP:

Indications for IVP removal include:

- Catheter related infection
- Persistent catheter occlusion or catheter related thrombus
- Damaged catheter
- End of treatment

IVPs are generally removed in a sterile environment (e.g. theatre or cath lab), under local or general anesthesia by experienced personnel – refer to local health service policy for removal procedure.



Health services will have their own policies outlining all procedural steps required to care for an IVP (accessing, blood sampling, line changes and deaccessing). Refer to your local health service policy for this information or the eviQ website <https://www.eviq.org.au/> - CVADs.

Simulated training sessions can be provided to assist staff attain the clinical skills required to manage IVPs in accordance to local hospital policy. Contact CET for more information.

Demonstration of competency will be in accordance with local health service policy.

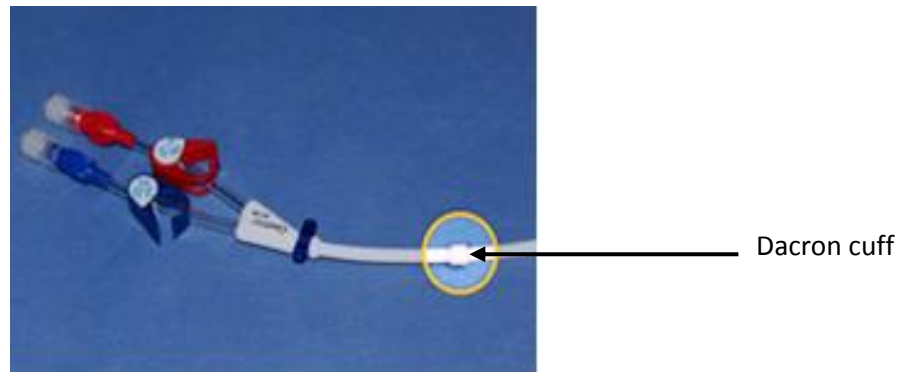
TUNNELLED CATHETER

Figure 2:



A common tunnelled catheter is the Hickman[®] and this term often used interchangeably to describe a tunnelled catheter. A tunnelled catheter is made of silicone or polyurethane with an inbuilt cuff (made of Dacron).

Figure 15: External tunnelled catheter with Dacron cuff



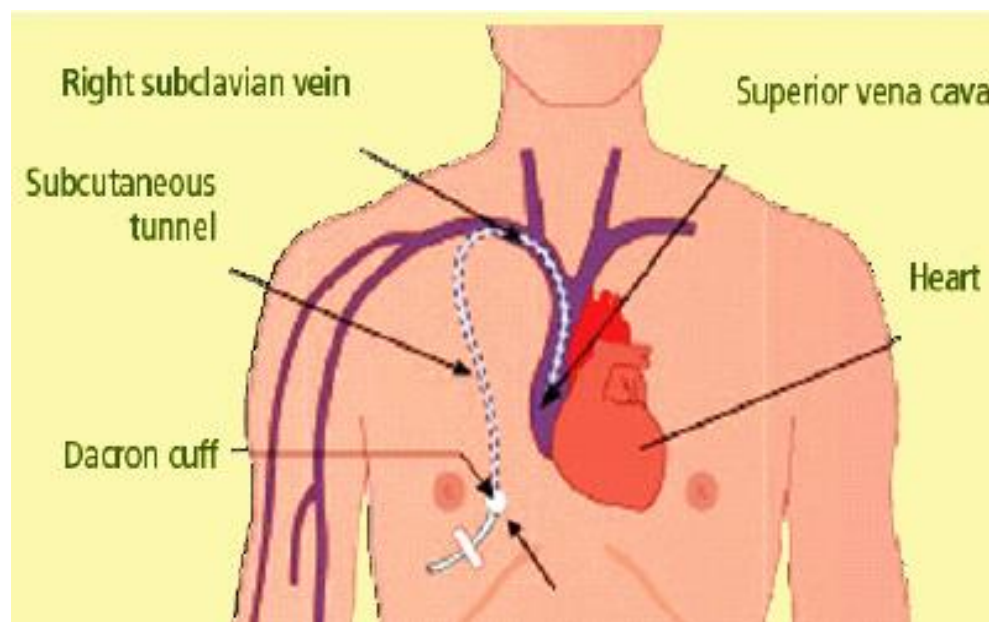
A tunnelled catheter is inserted subcutaneously on the chest wall. The proximal end lies within the lower third of the SCV with the distal end exiting the chest wall. The tunnelling of the catheter provides a physical barrier to help reduce the risk of systemic infection. In addition, a cuff sits within the tunnel to allow for adherence of fibrous tissue. This prevents dislodgement and acts as a mechanical barrier to ascending bacteria.



There are numerous tunnelled catheters available in clinical practice and it is important to know which ones you are looking after.

Do you know which external tunnelled catheters you see in clinical practice? If not where would you be able to find this information?

Figure 16: Placement of a tunnelled catheter



Pre and post insertion care

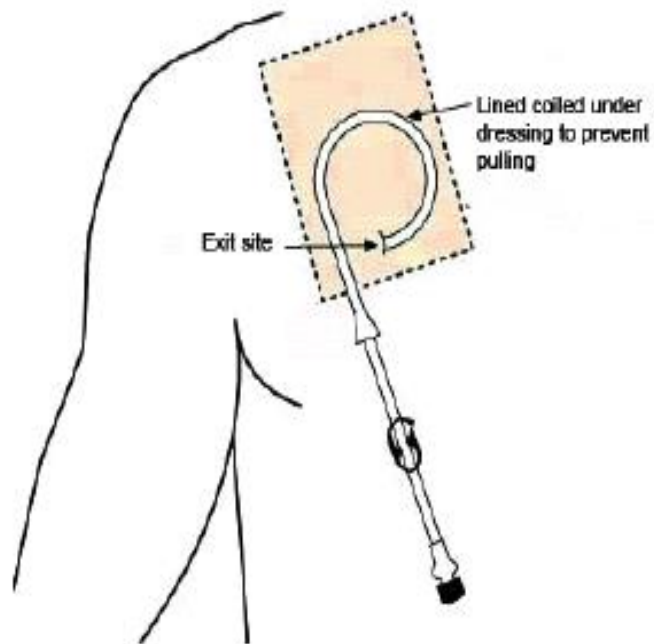
A full blood examination and coagulation profile may be required prior to insertion. Post insertion care is required until the incision site has healed. Keep the site dry and covered until any sutures present are removed (if not dissolvable) and protect the area from getting wet when showering or bathing.

Check your local hospital policy on the care of a tunnelled catheter. However, the following can be used as a guide where this information is not available.

- All dressings should be changed if not completely intact, dry and clean
- The primary dressing should be changed at 24 - 48hours (however if the dressing is intact, leave until the next scheduled dressing date)
- Frequency of dressing change will depend upon the type of dressing material used.
 - A gauze dressing covered with either TSM or a nonwoven fabric will need to be changed every 48hours
 - A TSM dressings every 7 days
- The site can be left open when completely healed – approximately 21 days following insertion (unless clinically indicated e.g. if the patient is immunocompromised). The site still needs to be kept dry when the patient showers or baths.

Special considerations - Dressing technique

A TSM dressing or equivalent can be placed over the site with the catheter coiled under the dressing to prevent pulling. See Figure 17: Dressing techniques for an external tunnelled catheter



Removal of a tunnelled catheter

Indications for tunnelled catheter removal include:

- Catheter related infection
- Persistent catheter occlusion or catheter related thrombus
- Damaged catheter
- End of treatment

Tunnelled catheters are generally removed in a sterile environment (e.g. theatre or cath lab), under local anesthesia by experienced personnel. Removal requires a minor surgical cut down to remove the cuff if the catheter has been in situ for more than approximately three weeks.



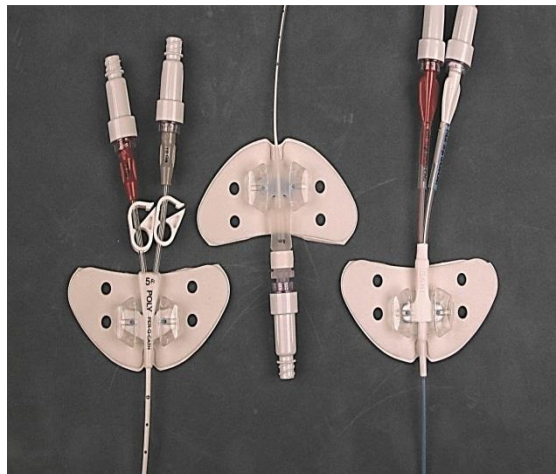
Health services will have their own policies outlining all procedural steps required to care for a tunnelled catheter (dressing changes, accessing, blood sampling, line changes and deaccessing). Refer to your local health service policy for this information or the eviQ website <https://www.eviq.org.au/>

Simulated training sessions can be provided to assist staff attain the clinical skills required to manage IVPs in accordance to local hospital policy. Contact CET for more information.

Demonstration of competency will be in accordance with local health service policy.

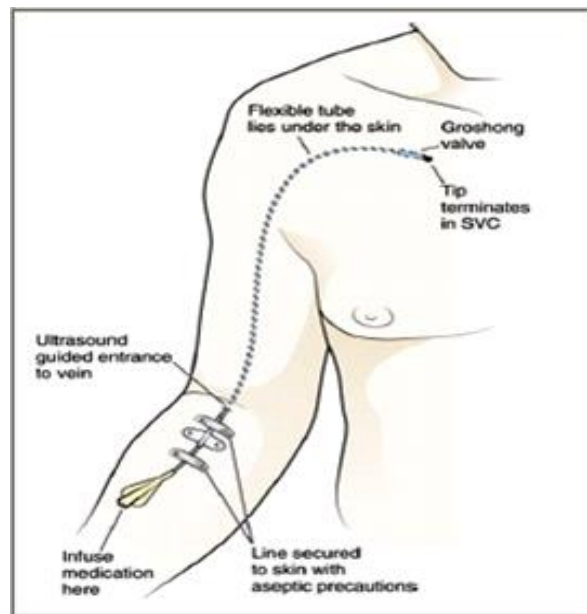
PICC

Figure1



A PICC is a 50 – 60 cm catheter made of silicone or polymer. PICCs can be inserted percutaneously into the basilic or cephalic vein with the proximal end of the tip residing in the lower third of the SVC.

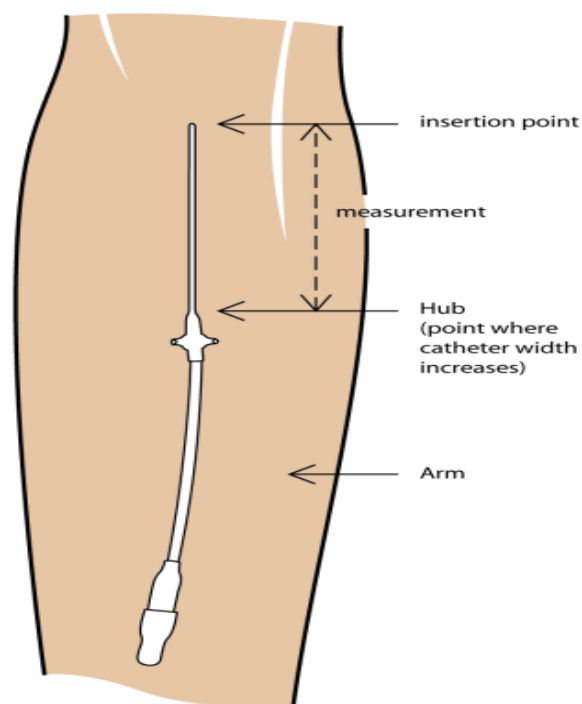
Figure 18: Placement of a PICC catheter



Unlike our previous CVADs PICCs can be inserted in radiology, unit procedure room or patient's bedside under local anaesthesia by a suitably qualified health care professional. The total length of the PICC line should be documented (particularly when the catheter tip has been trimmed), as well as the external catheter length in the patients' medical record.

The PICC line is to be measured at each dressing change and documented in the patients' medical record. Various methods can be used to measure the catheter length such as measuring the total length of the catheter, measuring the catheter from the insertion site to the catheter hub see figure 19 and some catheters come equipped with their own measuring scale on the outer side.

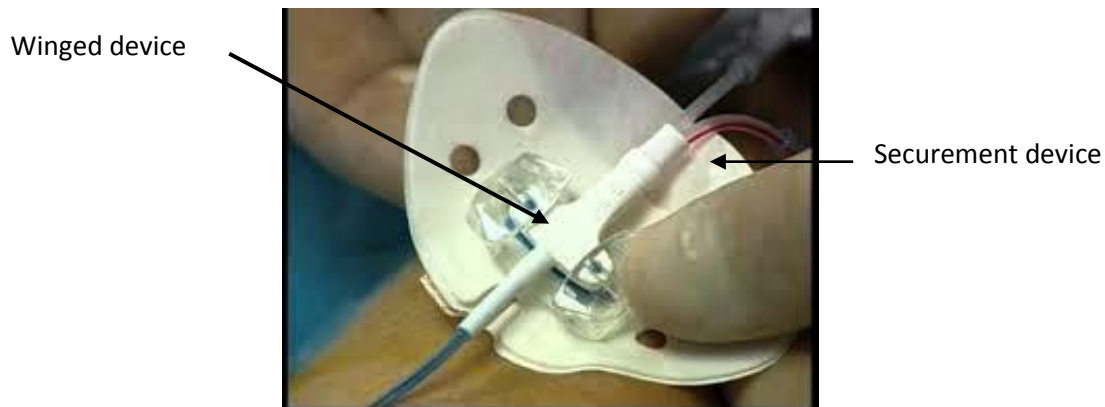
Figure 19:



Note: Report and do not use if there is catheter migration of 2cms or more. A catheter that has migrated externally should not be readvanced, as there is a high risk of introducing microorganisms into the catheter site or the catheter kinking.

The proximal end of a PICC has a sutureless winged device where a securement device (e.g. stat lock) can be used to secure the line. A sutureless winged device reduces the risk of needle stick injury to the clinician at insertion and catheter related infection.

Figure 20: PICC line with winged device and securement device



There are a number of securement devices available to secure external central catheters e.g. stat lock, PICC/CVC securement system and SecureCath. Whatever your health service uses, it is important to understand how to manage these devices appropriately to maximise catheter securement and prevent catheter migration and medical adhesive-related skin injuries (MARSI). Topical adhesives are also available to improve catheter securement and protect the insertion site from infection. For more information go to <https://www.youtube.com/watch?v=ANDcDvxD3eo>

Check your local hospital policy on the care of a PICC catheter. However, the following can be used as a guide where this information is not available.

- All dressings should be changed if not completely intact, dry and clean
- The primary dressing should be changed at 24 - 48hours (however if the dressing is intact, leave until the next scheduled dressing date)
- Frequency of dressing change will depend upon the type of dressing material used.
- A gauze dressing covered with either TSM or a nonwoven fabric will need to be changed every 48hours
- A TSM dressings every 7 days
- The dressing should cover the insertion site and securement device (if possible). Avoid the application of multiple dressing, as this will render the breathable mechanism of the dressing useless.

Note: Be sure to document in the patients' medical record and dressing when the next dressing change is due.

Special considerations – dressing technique

The stabilisation device should be changed every 7 days and can be combined with the cap/line change where possible. A chlorhexidine-impregnated dressing e.g. 3M™ Tegaderm™ CHG Chlorhexidine Gluconate Securement Dressing can be used to reduce the incidence of catheter related blood stream infections.

Figure 21: 3M™ Tegaderm™ CHG Chlorhexidine Gluconate Securement Dressing.



Specific techniques are required to secure and remove a PICC securement device. Please refer to your local hospital policy for further information. Where this information is not available, the following resources offer an example of how to perform a PICC dressing.



- Bard Medical STATLOCK® PICC Plus Stabilisation Device YouTube video - <https://www.youtube.com/watch?v=zCXTjiJdQfQ>

Keep in mind this video is not produced in Australia and may not reflect Australian standards. However the first 6 minutes of this video provides a good guidelines on the technique required to secure and remove a PICC securement device

How to secure catheter tubing:

- Catheter tubing can be looped and secured with tape. For PICC lines, the use of an elastic tubular bandage over the patient's arm and catheter exit site may provide security and comfort. (Ensure the bandage does not interfere with circulation)
- If taping lines, reduce risk of discomfort and pressure injury by ensuring the clamps are not pressing into patient's skin.

Removal of a PICC

Indications for IVP removal include:

- Catheter related infection
- Persistent catheter occlusion or catheter related thrombus
- Damaged catheter
- End of treatment
- Removal of a PICC should only be attended by suitably qualified staff in accordance with health service policy.

General principles when removing a PICC include the following:

- When removing a PICC the patient should be placed in bed in a supine position

- Removal of a PICC should be timed to occur at end inspiration
- Do not apply undue force as this may fracture the catheter
- Remove the PICC slowly to minimise venospasm
- Application of heat may assist to minimise venospasm
- Following removal pressure must be applied with sterile gauze until haemostasis is achieved
- The insertion site must be sealed immediately using an airtight occlusive dressing. This dressing is to remain intact and insitu for 48 hours to reduce the risk of late air embolism
- The catheter needs to be inspected post removal to ensure it is complete. Non-valved PICCs are often trimmed at the end on insertion. It is important that two staff members measure the length of the PICC against the total length at insertion to ensure it is intact
- Routine collection of the CVAD tip is not required when removing the device. If an infection is suspected the medical team may request that the tip is sent for microbiological examination
- Removal of a PICC must be documented in the clinical record.
 - The documentation should include:
 - Visual inspection and description of the integrity of the PICC
 - Whether the PICC tip was collected and sent to pathology
 - The condition of the PICC insertion site
- Following removal of a PICC the condition of the site should be monitored for 24 and 48 hours at a minimum



Health services will have their own policies outlining all procedural steps required to care for a PICC (dressing changes, accessing, blood sampling, line changes and deaccessing). Refer to your local health service policy for this information or the eviQ website <https://www.eviq.org.au/>

Simulated training sessions can be provided to assist staff attain the clinical skills required to manage IVPs in accordance to local hospital policy. Contact CET for more information.

Demonstration of competency will be in accordance with local health service policy.

CVAD Complications and Troubleshooting

Nurses have an important role to play in the prevention, early detection and management of complications related to CVADs. It is essential that nurses ensure that they thoroughly assess and document all care provided in the patients' medical record and care pathway.

Patients carers/family too need to be educated on the risks associated with CVADs, how they can minimise their risk and what to do and who to contact if any problems occur.

CVAD associated complications include:

- Catheter related infection
- Catheter occlusion
- Infiltration or extravasation
- Catheter tip migration or catheter damage
- Accidental removal of chemotherapy from an IVP
- Needless injection cap falls off

Catheter related infection

The most common life-threatening complication of CVADs is catheter related blood stream infection. Catheter related infections are less likely with IVPs given that these devices are protected by the patient's skin when not in use.

Note: Prevention of infection is key. Careful attention to ANNT is vital to CVAD care.

Infections can be classified as early (occurring within three weeks of insertion), or late (occurring after three weeks) and can be localised or systemic.

Contributing factors include:

- The patient themselves e.g. those who may be immunocompromised
- The insertion site and method of insertion
- Maintenance conditions of staff and patients
- Catheter related thrombosis and build- up of biofilm is associated with an increase of infection.

Physical signs of infection include:

- Local – pain, exudate, swelling, tracking
- Systemic – fever, rigors, hypotension (systemic compromise)

Immediate Management:

Do not delay; seek medical assistance for further assessment and treatment strategy according to local hospital policy particularly if the patient demonstrates symptoms of systemic compromise.

In general, a local infection may be managed by:

- Obtaining a culture of the exit site/drainage, apply dressing and commence antibiotics as per medical order
- Do not use topical anti-microbial ointment at the exit site as this promotes fungal infections and antimicrobial resistance
- Review dressing care plan i.e. frequency of dressing may need to be increased to keep the site clean of exudate and enable regular assessment

A systemic infection may be managed by:

- Collecting blood cultures from all lumens of the CVAD and peripheral blood culture
- Administration of parental antibiotics as per medical order; administer the antibiotics via all lumens during the course of treatment (a CVAD does not need to be removed unless it is visibly infected).
- If thrombus-related infection is suspected; consider the use of anti-thrombolytic to lyse clot and prevent recurrent infection

Catheter removal may be considered if

- There is persistent tunnel infection over a number of weeks
- Fungal infection
- Continued infection despite antibiotic therapy
- Confirmed catheter-related blood stream infections
- Risk of progressive infection in a patient who is neutropenic

Catheter Occlusion

Catheter occlusions are the most common non-infective complication associated with CVADs.

Occlusions can be partial (where fluid can be infused but unable to be withdrawn), or total occlusion (fluid is unable to be infused or withdrawn).

Note: Effective flushing using the manual pulsating action technique is key to preventing chemical or thrombic related catheter occlusions.

Contributing factors include:

- Mechanical
 - External (clamped kinked IV tubing)
 - Internal (CVAD tip malposition, pinch off syndrome - tubing caught between first rib and clavicle)
- Chemical - Drug precipitates may cause obstruction when incompatible medications or fluids are administered without flushing the catheter
- Thrombotic occlusions
 - fibrin sheath - tail forming on the catheter tip acting as a one-way valve
 - mural - fibrin from the catheter surface binds with fibrin from a vessel wall injury and forms a venous thrombus
 - intraluminal clot or fibrin deposits and/or sludge accumulation within a portal reservoir
 - Partial or complete venous obstruction

Sequelae may include post-phlebitic syndrome of the upper extremities, pulmonary embolism, infection and drug infiltration/extravasation due to fibrin sheath thrombosis

Figure 22: Characteristics of thrombotic occlusions

Intra luminal Signs: Sluggish flow or unable to infuse	Fibrin Tail Fibrin encases the catheter	Fibrin Sleeve Fibrin totally encases the entire external length catheter surface
<u>Sudden /gradual onset</u> <input type="checkbox"/> <u>History of:</u> <input type="checkbox"/> Transfusion <input type="checkbox"/> Blood sampling <input type="checkbox"/> Poor flushing <input type="checkbox"/> Empty infusion <input type="checkbox"/> Patient diagnosis	<u>Gradual onset</u> <input type="checkbox"/> Allows for infusion <input type="checkbox"/> Inability to aspirate blood <input type="checkbox"/> Length of catheter dwell time	<u>Gradual onset</u> <input type="checkbox"/> Persistent withdrawal occlusion (PWO) <input type="checkbox"/> Retrograde flow at insertion site –leaking at insertion site

Mural Thrombus

A mural thrombus is caused by irritation of the catheter tip against the intima of the vein, leading to an accumulation of fibrin. This causes the catheter to adhere to the vessel wall and may lead to deep vein thrombosis.

Note: If a CVAD is partially occluded treatment should not commence until blood return is obtained. Multi lumen catheters should also not be used unless blood return can be obtained (or imaging has confirmed patency and appropriate placement).

Immediate Management:

Never use force or a smaller syringe to attempt to unblock a CVAD

Troubleshooting

- Assess as to the possible cause of occlusion. Physical signs of occlusion can depend on the contributing factor and can range from no symptoms to symptoms of venous obstruction such as oedema, redness, and venous distension on the affected side.
- Check for mechanical occlusion: catheter clamped or kinked. You may also change the catheter patency device to exclude equipment failure
- Ask the patient to change position. This may undo internal kinks
 - Raise patient arms above their head
 - Roll shoulder back/forward
 - Change position from sitting to reclining to lying flat
 - Lie patient on left side and cough deep breathing
 - Turn head away from insertion site
 - Check catheter securement and length for signs of migration (PICCs and Hickman)
 - If the above fails seek medical assistance to establish the cause of the occlusion, (a chest x-ray or venogram may be required). Immediate management will depend upon the contributing factor
 - If the blockage is due to a thrombolytic occlusion, a tissue plasminogen activator (tPA) alteplase may be used to break it down.

- Where there is complete catheter occlusion, alteplase can be instilled using the 3 way tap – negative pressure technique (refer to eviQ for further information <https://www.eviq.org.au/>)
- The ongoing effectiveness in using tPA to manage occlusions is not confirmed and clots that persist for more than seven days become resistant to thrombolytic treatment therefore thrombotic occlusions should be treated as soon as they are identified
- However, not all regional and rural service providers will have access to alteplase or have a policy for its use. In this instance, contact the treating facility for further direction. Administration of anticoagulants such as heparin or clexane may be required in the case of venous obstruction to prevent propagation of the clot and obstruction of the collateral vessel (postphlebitic syndrome)

Note: Some CVADs may continue to be used despite the fact that they do not bleed but have been investigated (using a portagram), and are flushing well.

Infiltration/extravasation

Infiltration occurs with the inadvertent administration of non-vesicant solutions into surrounding tissue whereas extravasation is the inadvertent administration of vesicant solutions into surrounding tissue. Extravasation can lead to tissue necrosis, pain, infection, loss of mobility of the extremity and surgical procedures.

Contributing factors:

- Incorrect port access (wrong angle or length needle) or port needle dislodgement
- Catheter tip malposition/migration
- Internal catheter damage
- Fibrin sheath formation
- Faulty equipment
- Human error

Signs and symptoms of extravasation may include:

- Pain, tenderness or burning sensation
- Leakage at needle insertion site
- Aspiration difficulties, resistance or absence of free flow infusions

Immediate management:

Extravasation is considered an oncology emergency and action should be immediate.

- Stop the infusion and determine if the drug administered is a vesicant, irritant or non- vesicant
- Leave the needle insitu and aspirate any remaining drug from the catheter
- Determine a plan of action according to local hospital policy

Catheter Line Migration or Damage

CVAD tips can spontaneously migrate at any time during an indwelling period and is more common in long-term devices.

Any deviation of the CVAD tip from the lower SVC can lead to the development of:

- Catheter dysfunction
- Catheter fracture/migration
- Venous thrombosis

- Venous perforation
- Cardiac tamponade

Contributing factors:

- Normal anatomical forces/bodily movements that increase intrathoracic pressure e.g. coughing, sneezing, vomiting or upper extremity movement such as golf
- Forceful flushing

Physical signs and symptoms may include:

- Palpitations
- Patient may report having 'Strange sensations' when fluid infusing
- More or less of the external catheter may be evident
- Difficulty in flushing i.e. partial or total occlusion

Conversely, a patient may not exhibit any symptoms of catheter migration

Immediate Management:

If catheter tip migration is suspected a chest x-ray should be performed. Appropriately, qualified staff may reposition the catheter. However if this is not possible, the catheter should be removed as per health service policy.

Catheter Damage

CVAD catheters can be damaged at any point along the line - both internally or externally.

Contributing factors:

- Manufacturing defect
- Applying excessive pressure on the CVAD when flushing or clearing an occlusion
- Incorrect insertion of needle, when accessing an implanted port, subsequently piercing the catheter
- Repeated mechanical stress as occurs with pinch-off syndrome
- Patient activity (exercise, accidental slicing of the catheter with scissors while gardening)

Note: Only ever use a 10ml syringe and do not use excessive force when attempting to flush or unblock a CVAD.

Physical signs and symptoms:

- Internal:
Often vague should be considered if there is difficulty obtaining a blood flow or infusing solutions. Patients may report popping, burning, stinging sensation in arm
- External: Evidence of catheter damage

Immediate management:

This will depend on where the damage has occurred. Check your local hospital policy for further information. . However, the following can be used as a guide where this information is not available.

Internal fracture:

- Patient should be instructed to report to ED or Urgent Care
- Place the patient on their left side in Trendelenburg position and apply oxygen

- An urgent chest x-ray should be performed to confirm catheter fragmentation and location

Treatment may involve interventional radiological removal of the fragment via femoral puncture and snaring of the CVAD segment. If this is unsuccessful, open surgery may be necessary.

External fracture:

- Immediately clamp the portion of CVAD remaining outside the skin proximal to the damage and seek further medical advice immediately
- Repair of the catheter may be possible and should only be performed by suitably qualified staff according to hospital policy. If this is not possible the CVAD should be removed



The Cancer Nurse's Society (CNSA) 2007 has further information on complications associated with CVADS. To find out more go to:
<https://www.evig.org.au/Protocol/tabid/66/categoryid/432/id/191/Supporting+Document++Central+Venous+Access+Device+Line+Selection.aspx> to find out more.

Accidental removal of chemotherapy from an IVP

There is an increasing trend towards giving intravenous chemotherapy via an IVP using a portable pump. The pump is programmed to give the prescribed amount of chemotherapy over a specified period. The treatment centre should educate the patient in the event the non-coring needle is accidentally removed from a CVAD

Immediate management includes the following:

- Clamp the line immediately and put gloves on
- Do not disconnect the infusor
- Place the infusor in a plastic bag
- Go to your treatment facility or to the nearest hospital emergency department if out of hours

If the chemotherapy touches your skin, rinse the area with running water and wash with warm soapy water.

If the chemotherapy goes on your clothing or linen, wash these items separately using a hot or cold wash at the maximum cycle, then line dry.

The needless injection cap falls off

When a needless injection cap falls off an open valved catheter, there is the risk of bleeding, air embolism and infection in the patient.

The following can be applied to reduce the risks associated with disconnection

- Clamping an open-valved catheter when not in use
- Use of lure lock needless injection caps

If a needless injection cap does fall off during an infusion, the catheter should be immediately clamped and the patient assessed for any adverse outcomes. The patient should be instructed to return to the treating facility or attend the nearest hospital emergency department if the cap accidentally falls off at home.

The end of the catheter should be inspected using an ANNT technique and thoroughly cleaned using 2% chlorhexidine gluconate in 70% isopropyl. Once dry a new sterile needless injection cap should be applied.



Further Reading:

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Appendix: 1: CVAD care pathway (WHCG example)

11/2012 www.kingpinnacle.com.au

CENTRAL VENOUS ACCESS DEVICE MANAGEMENT
WIMMERA HEALTH CARE GROUP

DO NOT WRITE IN MARGIN

FULL NAME _____

DOB _____

URN _____

DATE _____

(to be used if available)

<input type="checkbox"/> P.I.C.C	<input type="checkbox"/> Central Venous Catheter	<input type="checkbox"/> Hickman's Catheter	<input type="checkbox"/> Infus-a-port / Port-a-cath
<p>Date of Insertion _____</p> <p>Position _____</p> <p>Length of Insertion _____</p> <p>Arm Circumference _____</p> <p>IV Giving Set to be changed every 72 hours</p> <p>Dressing Change after 24 hours then weekly</p> <p>Stat-Lock Change Weekly</p> <p>Positive Fluid Displacement Valve Change Weekly</p> <p>Flush with 20mL Normal Saline Weekly</p> <p>P.I.C.C Line measures due daily whilst inpatient & at dressing or weekly - record findings overleaf</p>	<p>Date of Insertion _____</p> <p>Position _____</p> <p>Mainline Giving Set changed every 72 hours</p> <p>TPN Bag & Giving Set changed every 24 hours</p> <p>Cernevit Giving Set changed daily</p> <p>Dressing changed weekly & pm</p> <p>Positive Fluid Displacement Valves changed Weekly</p> <p>Flush unused ports with 10ml normal saline TDS</p>	<p>Date of Insertion _____</p> <p>Position _____</p> <p>Skin Suture Removal Due (7-10 days post insertion)</p> <p>Catheter Securing suture Removal Date (2-3 Weeks post insertion)</p> <p>IV Giving Set to be changed every 72 hours</p> <p>Flush with 20mL Normal Saline Weekly</p> <p>Positive Fluid Displacement Valve Changed weekly</p> <p>Dressing Required for 2 weeks post insertion</p>	<p>Date of Insertion _____</p> <p>Position _____</p> <p>Gripper Needle Size _____</p> <p>Gripper Needle to be changed weekly</p> <p>IV Giving Set to be changed every 72 hours</p> <p>Heparin 1000 units/ml made up to 10mL using normal Saline as per Nursing Procedure 7.2 (usually on discharge)</p> <p>Positive Fluid Displacement Valve Change Weekly</p>
<p>Dressing Change 24hrs post insertion</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p> <p>Dressing/Stat-Lock/Valve Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p> <p>Dressing/Stat-Lock/Valve Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p> <p>Dressing/Stat-Lock/Valve Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p> <p>Dressing/Stat-Lock/Valve Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p>	<p>Dressing/Valves/Line Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p> <p>Dressing/Valves/Line Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p> <p>Dressing/Valves/Line Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p> <p>Dressing/Valves/Line Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p>	<p>Dressing Change 24hrs post insertion</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p> <p>Dressing/Valve Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p> <p>Dressing/Valve Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p> <p>Dressing/Valve Change</p> <p>Date _____ Sign _____</p> <p>Next Due _____</p>	<p>Gripper Needle Inserted</p> <p>Date _____ Sign _____</p> <p>Blood Return Present <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Gripper Needle Due _____</p> <p>Gripper Needle/Valve Change</p> <p>Date _____ Sign _____</p> <p>Blood Return Present <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Gripper Needle Due _____</p> <p>Gripper Needle/Valve Change</p> <p>Date _____ Sign _____</p> <p>Blood Return Present <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Gripper Needle Due _____</p> <p>Hep-Lock given/Gripper Needle Removed</p> <p>Date _____ Sign _____</p>

DO NOT WRITE IN MARGIN

CENTRAL VENOUS ACCESS DEVICE MANAGEMENT

MR 465

P.I.C.C LINE MEASUREMENT

[illegible]

DO NOT WRITE IN MARGIN

Appendix 2: Quiz

NAME _____ DATE _____

MULTICHOICE QUESTIONS

1. Which of the following is **NOT** a type of CVAD?
 - a). Tunnelled catheter
 - b). Epidural infusion
 - c). PICC
 - d). IVP
2. The tip of a CVAD resides in the
 - a). Superior Vena Cava (SVC)
 - b). Right atrium
 - c). Femoral artery
 - d). Subclavian vein
3. In which of the following situations is a CVAD contraindicated or NOT required?
 - a). Poor, difficult or unavailable venous access
 - b). Infusions of vesicant drugs, that may cause damage and/or pain if infused peripherally
 - c). Administration of four doses of post-operative antibiotics
 - d). Continuous or multiple infusions
4. Pulsatile technique refers to
 - a). The stop/start method of flushing a CVAD
 - b). Checking a patient's pulse before using a CVAD
 - c). Flushing a CVAD before and after accessing
 - d). Flushing a CVAD to determine patency
5. Pulsatile technique is used to
 - a). Block a CVAD
 - b). Create turbulence in the syringe
 - c). Create turbulence in the CVAD to reduce blockage
 - d). Determine patency of a CVAD
6. When removing a PICC line
 - a). Have the patient sitting up
 - b). Remove the catheter as quickly as possible
 - c). Let the patient breath normally
 - d). Measure the length of the PICC against the total length at insertion
7. The minimum sized syringe used when accessing a CVAD is
 - a). 3ml
 - b). 10ml
 - c). 5ml
 - d). 20ml
8. The only type of needle that should be used to access an Implanted Venous Port is a
 - a). Non-coring needle
 - b). Intravenous needle
 - c). Hypodermic needle
 - d). Butterfly needle

9. Which of the following is NOT a major complication of CVAD use?
- a). Localised bleeding at the insertion site within the first 24 hours
 - b). Infection
 - c). Thrombosis
 - d). Blockage
10. PICC dressings should be changed (more than one answer may be correct)
- a). Every day
 - b). 24 hours post insertion, (however if intact, leave until the next scheduled dressing date)
 - c). Every 72 hours
 - d). If gauze is present beneath the occlusive dressing - every 48 hours
11. When a CVAD is used for blood sampling, the first 3-5 10 millilitres of blood is
- a). Never discarded
 - b). Discarded when taking blood for blood cultures
 - c). Discarded when taking routine blood tests
 - d). Always discarded
12. After blood sampling a CVAD should be flushed in a pulsatile manner with?
- a). 10ml – 20ml normal saline
 - b). 20ml weak heparin saline
 - c). 15ml normal saline
 - d). 5ml normal saline
13. At what interval should the status of a CVAD be clearly and consistently documented?
- a). At the end of the week
 - b). Only when there is a complication
 - c). Only after insertion
 - d). At the end of each shift and/or treatment and/or access
14. If blood cannot be aspirated via the CVAD, the appropriate course of action involves (more than one answer may be correct)
- a). Consultation with physician
 - b). Possible radiological investigation
 - c). Delaying the use of the CVAD until placement is confirmed
 - d). Try aspirating with a 2ml syringe
15. What type of dressing should be over the PICC line insertion site?
- a). A transparent, waterproof occlusive dressing
 - b). A simple gauze dressing and bandage
 - c). A bandaid
 - d). No dressing is required
16. A septic shower
- a). Will only occur if there is obvious signs of infection at the entry site
 - b). Is harmless and will not affect the patient in any way
 - c). Is a possible complication of all CVADs
 - d). Can only occur with PORTs

Questions Adapted from: Nurse Education Gippsland. (2009). Management of Central Venous Vascular Access Devices. Gippsland: Gippsland Health Services Consortium.

Appendix 3: CVAD COMPETENCY ASSESSMENT

On completion of this learning package and supervised simulation, the nurse should possess the necessary prerequisite knowledge and skills to manage central venous access devices (CVADs) safely and according to their relevant health service policy, procedures or clinical guidelines.

The eviQ CVAD suite of assessment tools will be applied to assess competency of staff following completion of this self-directed learning package.

Templates include:

1. Accessing a CVAD
2. De-accessing a CVAD
3. Accessing an IVP
4. De-accessing an IVP
5. Dressing and needleless injection cap change for a CVAD
6. Blood sampling for a CVAD
7. Removing a CVAD

An eviQ assessor's handbook is available to help guide staff assessment

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