West Midlands Cancer Alliance

Guideline for the care and management of Central Venous Access Devices (CVADs) v1.0

West Midlands Cancer Alliance

This sheet is to accompany all documentation agreed by the West Midlands Cancer Alliance Expert Advisory Groups. This will assist the Cancer Alliance to endorse the documentation and request implementation.

EAG name	West Midlands Cancer Alliance Systemic Anti-cancer Treatment Expert Advisory Group (WMCA SACT EAG)	
Document Title	Guideline for the Care and Management of Central Venous Access Devices (CVADs) version 1.0	
Published date	06/12//2023	
Document Purpose	These guidelines have been developed to assist in the care and maintenance of central venous access devices. Ensuring safe and effective practice with regards to preventing infection and standardising practice throughout hospitals. This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.	
Authors	This guideline is based on Spire Healthcare's CVAD guideline and amended by Sam Toland and reviewed by SACT clinicians in West Midlands trusts. The guideline was reviewed and agreed by the West Midlands Cancer Alliance SACT EAG for use in SACT services in the region.	
Review Date (must be within three years)	06/12/2025	
Approval Signatures:	**EAG Chair** Sam Toland Date: 23/10/2023	**Cancer Alliance Clinical Director** Dr Lydia Fresco Date: 06/12/2023

Tracker

Version	Date	Amendment
1.0	06/12/2023	New document

Contents

1. Introduction

The purpose of this document is to provide guidance on the care and management of Central Venous Access Devices (CVADs). Strategies for managing complications will also be outlined within the guidance.

2. Scope of this document

This guideline has been produced to support practitioners in identifying and managing Central Venous Access Devices (CVADs) in patients undergoing intravenous (IV) anti-cancer treatments or IV therapies. This will ensure that there is a standardised, evidence-based approach to the care of CVADs for clinical practitioners, which will minimise the risk to patients as a result of poor practice and preventable complications.

3. Definitions

A CVAD is a catheter or implanted port where the tip terminates in the vena cava either superior or inferior depending on upper or lower extremity placement (Moureau, 2019).

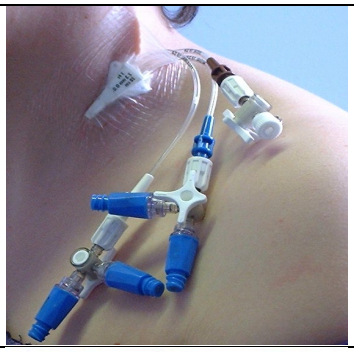
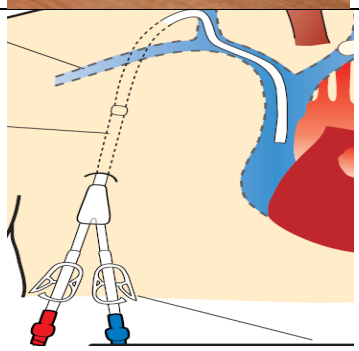
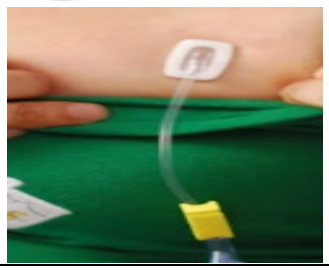
CVADs can be utilised for most types of intravenous therapy but there are specific indications when a CVAD should be chosen over a peripheral access device:

Indications for use of a CVAD:

- Infusion of drugs that are harmful to peripheral veins such as some anti-cancer agents.
- To provide reliable access for patients requiring long term therapies.
- To provide immediate access in emergencies.
- Patient preference
- Patients that are needle phobic
- Infusion of blood products.
- Administration of parenteral nutrition (PN).
- Plasmapheresis.

NICE (2017)

4. Types of CVADs

Direct access central catheter – inserted directly into large vein, usually internal or external jugular or subclavian vein.	
Peripherally Inserted Central Catheter (PICC) – inserted via arm vein (usually basilic or cephalic) and advanced into vena cava	
Tunnelled catheter – inserted into either jugular or subclavian veins and tunnelled subcutaneously to exit at a distant site.	
Totally implantable vascular access device (TIVAD) – catheter inserted into jugular, subclavian, basilic or femoral veins and port placed nearby in a subcutaneous 'pocket', beneath the skin.	 

5. Advantages and disadvantages of CVAD

Advantages	Disadvantages
Provides reliable long-term access.	Increases the risk of infection.
Can be used to take multiple blood samples.	Increases the risk of thrombosis.
Can be used to give multiple infusions via one catheter.	Has insertion related risks.
Removes the need for repeated venepuncture/ multiple cannulas.	Insertion can be traumatic for the patient.
Can be used to monitor central venous pressure.	Can affect body image.

6. Training and awareness

Intravenous therapy is now an integral part of the majority of nurses' professional practice. Healthcare practitioners who are responsible for the care and management of CVADs must be trained and undergo competency assessment, following with a period of supervised practice thus, act in accordance with the Nursing and Midwifery Council Knowledge and Skills practice (NMC 2015).

All registered and non-registered healthcare professionals involved in the management and care of a CVAD must achieve competencies in:

- Intravenous / Infusion therapy.
- Central Venous Access Device care.
- Aseptic Non-Touch Technique (ANTT).
- Have cared for a central venous access device within the preceding three-month period or demonstrated competency through use of training/updates.
- Maintain evidence of continued practice and updated knowledge.

7. Aseptic Non-Touch Technique

When caring for a CVAD Aseptic None Touch Technique (ANTT) is the standard intravenous technique used regardless of whether they are peripherally or centrally inserted and is the standard aseptic technique used in the UK (Rowley and Clare 2011).

The underlying principles of ANTT are the protection of key parts and key sites. Therefore, ensuring that you DO NOT handle any part of the equipment that comes into direct or indirect contact with the liquid infusion.

Key-Sites – Areas of skin penetration that provide a direct route for the transmission of pathogens into the patient and present a significant infection risk. Key-sites include surgical wounds, skin breakdowns or exit sites from CVAD/PVC placement.

Key-Parts - Critical parts of medical devices/items of procedure equipment that, if contaminated, provide a route for the transfer of harmful microorganisms directly onto or into a patient. In IV therapy, these include any part of the equipment that comes into direct or indirect contact with the liquid infusion. (Moureau,2019).

8. Care and maintenance of Central Venous Access Device

8.1. Assessment and observation prior to accessing the device

It is important to assess the insertion site for any signs of infection or bleeding. A visual inspection of the CVAD insertion site should be carried out assessing for redness, swelling or any signs of infection such as, pain tenderness, firmness, blanching, moisture, oedema or oozing around exit site. All findings should be documented in the patient record (Moureau 2013).

Within the assessment of the CVAD, the length of the catheter should be observed; this is verified by comparing the current external length of the catheter with the baseline measurement documented on the initial insertion of the catheter (Moureau 2013; Gorski et al. 2016).

8.2. Dressing

Once a CVAD has been inserted, the dressing provides the only protective barrier keeping microorganisms from entering the body. It is recommended that dressings are kept completely intact, that all edges are adhering to the skin and that the dressing is clean and dry. The dressing should be replaced if its integrity has been compromised by moisture, drainage, or blood under the dressing, if there are signs of sheering or dislodgement of the dressing or if there are signs and symptoms of infection such as redness, exudates or pain (Gorski et al. 2016; RCN 2016).

Dressings used for insertion sites should be sterile, transparent, semipermeable polyurethane dressings with a layer of an acrylic adhesive and/or gauze and tape (Loveday et al. 2014). Transparent dressings are permeable to water, vapour and oxygen and impermeable to microorganisms, these are used to minimise the risk of extra luminal catheter contamination and are recommended for CVADs. However, assessment and clinical judgment must be used as some patients are sensitive to these dressings.

Transparent semipermeable membrane dressing should be changed every 7 days or sooner if integrity of dressing compromised (EPIC 3—Loveday et al., 2014). Gauze dressings should be changed when inspection of the site is necessary or when the dressing becomes damp, loosened or soiled. Gauze dressings should be changed to a

transparent dressing as soon as possible, (EPIC 3 Loveday et al., 2014) or daily (Gorski et al., 2016).

The use of dressings can also be a preventative measure to secure the device reducing the risk of the CVAD becoming dislodged.

- TI-VAD (Ports) only require a dressing when the gripper needle is inserted to ensure the line does not become dislodged. If dislodgement occurs, there is a risk of extravasation, so it is important to secure the gripper device.
- Hickman lines have a Dacron cuff, this can take at least two weeks or more to attach to the skin. Until attachment, the line is at risk of infection and dislodgement. Therefore, a dressing would be required for the period until the Dacron cuff is well embedded.
- Some PICC lines can be sutured for securement, however many are not. Therefore, dressings are required to ensure the device is not dislodged. Not using dressings when required can lead to premature removal of the VAD (Gorski et al. 2016).

However, for PICC lines dressings alone should not be relied on to stabilise the CVAD, and a stabilisation device should be used. There are two main types of stabilisation devices:

- adhesive-based devices
- subcutaneous engineered stabilisation device.

The choice of securement device should be based on a risk assessment considering the patients age, skin integrity, previous adhesive skin injury and any type of drainage from the insertion site (Gorski et al. 2016).

Integrity of the stabilisation device should be assessed at each dressing change, and the stabilisation device changed according to the manufacturer's directions for use (usually weekly for adhesive devices). When removing the stabilisation device ensure the line is anchored using steri-strips to ensure the line does not become dislodged.

8.3 Catheter needle-free connector

Needle-free connectors (NFC) are access devices that attach to the end of the catheter lumen. They enable safe and easy connection to infusions, while eliminating the need to use a needle, thus reducing the risk of needle-stick injury (Curran 2016). There are many designs and types of NFC but there is no consensus on any type to prevent or reduce CVAD infections (Gorski et al. 2016). To achieve disinfection of a needle-free connector, the following factors should be considered:

- Weekly changing for the NFC.
- Ensure the NFC is cleaned with 2% chlorhexidine gluconate in 70% isopropyl alcohol wipe for 30 seconds and allow to air dry. (Gorski et al. 2016).

8.4 Catheter flushing and locking

The maintenance of CVAD catheters by healthcare professionals requires a high degree of knowledge, skill and understanding, therefore staff should not access a line until they have undergone the correct training and competencies. (RCN, 2016)

The purpose of flushing the catheter lumen, is to maintain patency as well as preventing the mixing of incompatible medications that may precipitate and occlude the lumen. When accessing the lumen of the CVAD, the ANTT method should be used to ensure safe practice. (Loveday et al. 2014).

The RCN (2016) infusion guidelines recommend no smaller than a 10 mL syringe to use when accessing and flushing a vascular access device, due to the risk of the pressure splitting the catheter.

Blood return:

Prior to flushing, it is common practice to check blood return from the lumen. It is important to check blood return prior to the administration of IV therapy to ensure the correct placement of the line. The absence of blood return should result in an investigation and evaluation of potential causes (Gorski et al. 2016).

Flushing:

Once blood return has been established, and the line is deemed safe to flush it should be flushed with 0.9% sodium chloride/normal saline (NS) 10mls, by using a pulsatile flushing technique and then the application of positive pressure at the end of the flush (RCN 2016). This ensures the cleaning of the internal walls of the lumen in which studies have shown that the turbulent flow created by the push- pause technique is considerably more effective at rinsing the lumen, in comparison to a continuous laminar flow (Guiffant et al. 2012).

Applying the Pulsatile flushing technique can reduce occlusions and help prevent infection, as well as clearing the catheter lumen of all traces of blood and medications, which can reduce the potential for bacterial adhesion and colonisation. (Ferroni et al. 2014; Moureau 2013).

Concurrently, when flushing the lumen, catheter function can be assessed to identify that the catheter has no malfunction or occlusion, such as thrombus (Gorski et al. 2016).

Ideally, the lumen should flush freely without resistance, and is classed as malfunctioning if flushing and/or aspiration becomes difficult or impossible (Goossens, 2016). Sluggish infusion and aspiration can be the cause of the accumulation of blood, fibrin and/or drug deposits that adhere to the internal surface and the tip of the catheter, leading to total occlusion if not adequately rinsed away (Dougherty and Lister, 2015).

Locking:

The procedure of locking a CVAD is to instil a solution within the lumen following its use. This prevents reflux of blood into the tip of the catheter maintaining its patency and prevents thrombus or fibrin formation in or around the catheter tip which reduces the risk of occlusion. (Gorski, 2016) Locking can also be used to break down an existing clot or treat an infection by penetrating and breaking apart any existing intraluminal biofilm (Goossens, 2015).

When locking a CVAD various solutions can be used ranging from 0.9% sodium chloride, anticoagulation therapy (Heparin/Hepsal) and thrombolytic therapy (urokinase/ alteplase). Valved catheters lock automatically and therefore do not require locking with heparin solutions.

When managing any CVAD in the in-patient setting, and the line is in frequent use, then it is recommended to flush and lock after every use with 10-20mls of saline 0.9% (NICE, 2017).

When CVAD are not regularly used, it is advised by the manufacturer that, implanted ports or open-ended catheter lumens should be flushed with saline 0.9% and locked with Heparin sodium flush solutions (NICE, 2017). It is recommended that CVADS that are not in frequent use should be flushed with saline and locked weekly, with the exception of implantable ports that may require monthly maintenance as recommended by manufacturers. Recommendations from manufactures suggest that 5mls of heparinized saline is required for the locking of open-ended CVAD, and that 100u/ml can be used, but other concentrations have also been found to be effective. The concentration should be based on patient's medical condition. It is felt that the technique of flushing and locking is more important than the solutions used for preventing occlusions. The use of correct pulsating method followed by positive pressure technique and locking the valve on the catheter, prevents blood reflux into the catheter tip, making this best practice (Gorski et al., 2016; Goossens, 2015; RCN, 2016).

8.5 Summary

Assessment	CVAD should be assessed every shift (inpatients) at a minimum or assessing the whole device on every access. For outpatients, it is recommended that patients/carers should be trained to assess the device on a daily basis. Assessing for signs of complication such as redness at exit site pain or any signs or symptoms of dressing

	dislodgement and report immediately to their healthcare provider.
Inspection	Assessing for signs of inflammation, infiltration or blockage.
Dressings	Semipermeable polyurethane dressings- change every 7 days unless compromised. Gauze dressings – require change every 2 days or when needed.
Stabilisation device	Check manufacturer's directions for use.
Needle free Connector	Change every 7 days or as per manufacturers guidance. Clean with 2% chlorhexidine gluconate in 70% isopropyl for 30 seconds prior to accessing, allow to air dry for further 30 seconds.
Blood return	To ensure correct placement of the catheter. Is required before every IV access for treatment.
Flushing	Requires saline flush- pulsating method 10mls every 7 days if outpatient, or following each access if inpatient, 20ml flush after blood taking. TIVAD (Port) according to manufacturer's guidance, generally 28 days.
Locking	For inpatients- saline flushing to lock with positive pressure on clamping if the line is used more than 3 times daily. Heparin lock only open-ended lines on discharge or if line not in frequent use. Valved catheters only require saline flushing. Open ended catheters – 5mls of heplock 100u/ml or dose concentration based on patient's medical condition.

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Appendix 1: Procedures for a TI-VAD (port) Insertion and Removal of a Gripper Needle and Blood Sampling.

Additional information:

Sutures post insertion	If sutures not dissolvable: 7 days removal for entry site 10-day removal for port site
Dressing	No dressings are required apart from when inserting gripper needle.
MRI	If patient requires an MRI radiology must be informed of port.
Defibrillation	Do not put defibrillation pads over the port
Recommended flushing of line if not in use	28 days or as recommended by manufacturer's guidance.

Port insertion of a Gripper needle, blood sampling and flushing:

Equipment:

- Hard surface (blue) tray (dressing trolley may be used if extra space is required)
- Topical local anaesthetic cream as prescribed (If required)
- Apron
- Alcohol hand gel
- Sterile dressing pack with sterile gloves
- Nonsterile gloves
- 3x10ml syringes
- Blunt fill needles x1 (blunt filtered needle if to access glass vial with snap top)
- 2% chlorhexidine gluconate in 70% isopropyl alcohol mop
- 2% chlorhexidine gluconate in 70% isopropyl alcohol wipes x1
- Gripper (non-coring) needle and extension tube
- A blue vacutainer connector
- Vacutainer
- Blood sampling bottles
- Sterile, transparent, semi-permeable CVAD dressing
- Small plaster for removal of gripper needle.
- Flushing solution (for example sodium chloride 0.9%)
- Prepared medication for bolus or infusion as required
- Heparin lock as prescribed (if required)

Procedure:

Action	Rationale
Explain and discuss the procedure with the patient. Obtain informed consent for the procedure (wherever possible).	Inform and reassure the patient. To obtain the patient's consent and co-operation.
NB. If required, apply topical local anaesthetic cream for 30-60 minutes prior to procedure. (or use anaesthetic spray)	To reduce the feeling of pain on insertion of needle.
Carefully wash hands using liquid soap and water and dry thoroughly.	To minimise the risk of infection.
Clean the trolley (tray) with soap and water followed by a recommended alcohol wipe and allow to air dry.	To minimise the risk of infection.
Collect the required equipment, check packing and expiry dates and place the equipment on the bottom shelf of the dressing trolley.	To ensure that time is not wasted, and that the procedure goes smoothly without unnecessary interruptions. To check that no equipment is damaged or out of date.
Identify the patient and ensure they are appropriately positioned to aid access to the implantable port and ensure patient and operator comfort.	To ensure correct identification of the patient and patient safety and prepare the patient for the procedure.
Assess the TI-VAD to ensure no infection or swelling around site. Swab if required.	Infection around site would need reviewing prior to insertion. Accessing the TI-VAD should be avoided and antibiotics prescribed.
Decontaminate hands with alcohol hand gel until dry.	Hands may have become contaminated by handling the outer packs.
Locate the port and identify the septum. Assess the depth of the port and the thickness of the skin.	In order to select the correct length of needle.
Choose the appropriate needle size and type depending on the type of port-a-cath the patient has in-situ.	In order to select correct gauge and configuration of needle.
Open the sterile dressing packs on to trolley.	To create a sterile field.
Attach a yellow clinical waste bag to the side of the trolley below the level of the top shelf.	To ensure contaminated material is below the level of the sterile field.
Open equipment required on to the sterile field.	To ensure all appropriate equipment for the procedure is available.
Decontaminate hands with alcohol hand gel and rub until dry.	Hands may have become contaminated by handling the outer packs etc.

Action	Rationale
Put on nonsterile gloves to Clean the skin over the port with 2% chlorhexidine gluconate in 70% isopropyl alcohol mop for 30 seconds and allow to air dry.	To minimise the risk of contamination and destroy skin flora.
Remove nonsterile gloves and apply sterile gloves.	To ensure aseptic technique.
Prime the gripper and extension tubing with sodium chloride (w/v) 0.9% in10ml syringe.	To prevent air embolus.
Using the non-dominant hand locate and stabilise the port	To prevent movement of the port.
Inform the patient that you are about to insert the needle.	To prepare the patient for a pushing sensation.
Insert the needle at a 90-degree angle to skin covering the port, until the needle hits the back plate.	To ensure the needle is well inserted into the portal septum.
Using an ANTT attach the 10ml syringe and draw back 5-10mls of blood and re-clamp line. (Unless obtaining blood cultures in which case follow procedure below for blood sampling) Discard syringe into a yellow sharp bin	ANTT to ensure no transition of microorganisms. 5-10mls of blood withdrawn to ensure there is no contaminated blood containing saline/heparinised saline which could cause inaccurate blood results.
For Blood Sampling: Attach vacutainer and unclamp line. Insert the blood bottles in required order for sampling. If taking blood cultures, these samples should be taken first, without discarding 5-10mls blood Re clamp line.	A secure safety device for taking bloods that ensure staff do not use needle and syringes, reducing risk of needle stick injuries. Blood sampling – 1st- Biochemistry Gold top 2nd- coagulation blue top 3rd- EDTA –purple top Samples taken in specific order to reduce contaminations of samples and then providing inaccurate blood results.
• Ensure you check patient details with patient. • Label the blood bottle by the patient. • Patients name/date of birth/hospital number (NHS number). Ensure the requesting bloods are correct and send as per local guidance.	Without correct patient details, the blood will be rejected. Staff should never pre label blood bottles or label away from patients as this is deemed unsafe practice and high risk for errors.

Action	Rationale
If the needle is to remain in situ: Flush with sodium chloride (w/v) 0.9%, as prescribed, using pulsatile flush and ending with positive pressure. For inpatient care gripper needles can stay in for one week before required to be changed. INPATIENT: flush with saline 10mls after each use. If line used less than 3 times in 24hrs flush with saline and heparinise with 5mls of Heparinised saline using a 10ml syringe (as per local guidance). (If the TI-VAD has a valved tip then only a saline flush is required)	The act of flushing with saline has the purpose of cleaning the internal walls of the lumen, as well as a key procedure of maintaining patency and preventing occlusion. Valved tip lines are not open-ended line and are only required to be flushed with saline, as recommended by manufacturer.
If needle is to be removed: Heparinise as above. Ensure that positive pressure is applied at the end of the 5ml flush. As approaching the last 1ml of solution, clamp the line and continue to flush at the same time.	Locking heparin into the TI-VAD creates a column of fluid inside the lumen to maintain patency. However, flushing and locking techniques are considered more important to prevent lines from occluding.
Maintain pressure on the plunger as syringe is disconnected from injection cap.	To prevent backflow blood and possible clot formation.
Press down on either side of the implantable port with 2 fingers; withdraw the needle using steady traction.	To support the port while removing the needle.
No dressing is usually required but a small plaster may be placed.	Prevent oozing at the site.
Dispose of all sharps and equipment immediately.	To ensure patient and staff safety.
Remove gloves and apron and dispose of. Carefully wash hands using liquid soap and water and dry thoroughly.	To minimise the risk of contamination.
Document the procedure and record details of site assessment in the patient's records adhering to Trust Documentation Standards.	To ensure adequate records and enable continued care of device and patient.

Appendix 2: Procedure for the management and care of Skin Tunnelled Catheters (Hickman Lines)

Additional information:

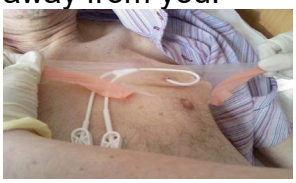
Sutures Entry site: removal 7 days Exit site: recommended 21 days depending on assessment of sutures.	This allows the Dacron cuff to adhere to the tissue.
Dressing/flushing and needle-free connector change is required every 7 days.	When patients are not having regular access for their line it is required to flush it weekly to ensure patency.
Should not be used for administering IV contrast.	Can cause the catheter to split.
Total parenteral Nutrition (TPN); If a double lumen catheter, one lumen should be designated solely to TPN	To ensure bloods are not taken from the TPN lumen.
Patients should be advised not to swim or submerge their Hickman lines/tunnelled catheter in water	Due to the risk of infection.
Once the cuff has sufficiently adhered, patients can remove dressing and clean under a shower (no soap) dry with clean towel, then replace dressing after.	To help reduce skin reaction and keep skin clean
In the long term, dressing use is not necessary once Dacron cuff has completely healed.	Once the Dacron cuff has healed, it prevents infection and secures device. If a patient is sensitive to dressing, they are not required but the line should be secured and kept clean.

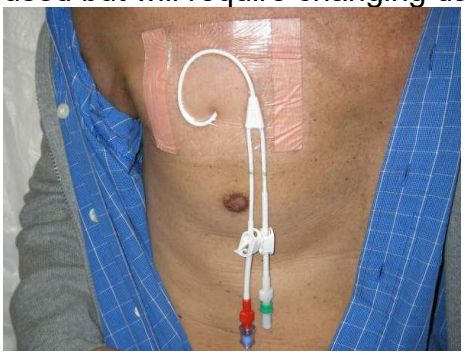
<u>Procedure for Dressing Change</u>

Equipment:

- Hard surface (blue) tray (dressing trolley may be used if extra space is required)
- Apron
- Alcohol hand gel
- Sterile dressing pack with sterile gloves
- Nonsterile gloves
- 2% chlorhexidine gluconate in 70% isopropyl alcohol mop
- 2% chlorhexidine gluconate in 70% isopropyl alcohol wipes x1
- Sterile, transparent, semi-permeable CVAD dressing

Procedure:

Action	Rationale
Explain and discuss the procedure with the patient. Obtain informed consent for the procedure (wherever possible).	Inform and reassure the patient. To obtain the patient's consent and co-operation.
Carefully wash hands using liquid soap and water and dry thoroughly.	To minimise the risk of infection.
Clean the trolley (tray) with soap and water followed by a recommended alcohol wipe and allow to air dry.	To minimise the risk of infection.
Collect the required equipment, check packing and expiry dates and place the equipment on the bottom shelf of the dressing trolley.	To ensure that time is not wasted, and that the procedure goes smoothly without unnecessary interruptions. To check that no equipment is damaged or out of date.
Identify the patient and ensure they are appropriately positioned to aid access to the line and ensure patient and operator comfort.	To ensure correct identification of the patient and patient safety and prepare the patient for the procedure.
Decontaminate hands with alcohol hand gel until dry.	Hands may have become contaminated by handling the outer packs.
Open the sterile dressing pack on to trolley.	To create a sterile field.
Attach a yellow clinical waste bag to the side of the trolley below the level of the top shelf.	To ensure contaminated material is below the level of the sterile field.
Open equipment required on to the sterile field.	To ensure all appropriate equipment for the procedure is available.
Decontaminate hands with alcohol hand gel and rub until dry.	Hands may have become contaminated by handling the outer packs etc.
Observe exit site and if red or of concern take a swab and escalate possible infection.	To ensure exit site is not infected and patient requires antibiotics.
When removing the dressing gently pull away from you.  Clean the skin with 2% chlorhexidine gluconate in 70% isopropyl alcohol mop thoroughly for 30 seconds, moving the mop from side to side and up and down creating friction; then allow to dry. Clean the line with 2% chlorhexidine gluconate in 70% isopropyl alcohol wipe	Take into account patients with a history of steroid medications and those with visibly thin, fragile skin. Special care should be given to application and removal. The pressure applied increases the skin surface area contact with the adhesive, and so greater pressure applied will increase the tension needed to remove the dressing and the stripping effect upon the patients' skin. To minimise the risk of contamination and destroy skin flora.

Action	Rationale
going from the exit site of the patient down towards the ends	By wiping away from the patient reduces the risk of infection around exit site.
Apply sterile gloves to redress the tunnel line. Loop the line as appropriate and apply a transparent semi permeable polyurethane dressing. If patient is sensitive to this type of dressing, a gauze dressing could be used but will require changing daily. 	The loop ensures that if the line gets pulled it doesn't course discomfort to the patient or pull line out. Dressings must be sterile, transparent, semi-permeable to secure the device. Where a semi-permeable dressing is used, there are lower colonisation levels with skin flora and therefore, the risk of a site or line infection is reduced. Using a transparent dressing allows observation of the exit site at all times. Dressings must be changed every 7 days or earlier if they become loose or there is blood or moisture build up. There is consensus across international guidance for the use of semipermeable clear dressings. If possible with integral or separate chlorhexidine and fixation If gauze based dressings are required, they need to be changed daily due to not being water repellent.
Remove gloves and apron and dispose of. Carefully wash hands using liquid soap and water and dry thoroughly.	To minimise the risk of contamination.
Document the procedure and record details of site assessment in the patient's records adhering to Trust Documentation Standards.	To ensure adequate records and enable continued care of device and patient.

<u>Procedure for accessing, blood sampling and flushing a tunnelled Catheter (Hickman line)</u>**:**

Equipment:

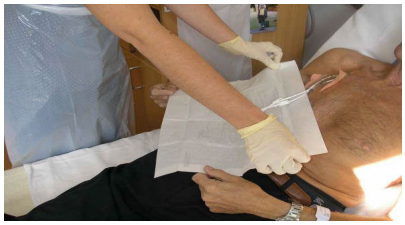
This is to flush 1 lumen tunnelled catheter, if there are multiple lumens additional equipment will be required.

- Hard surface (blue) tray (dressing trolley may be used if extra space is required)
- Apron
- Alcohol hand gel
- Sterile dressing pack with sterile gloves
- Nonsterile gloves
- 3x10ml syringes (you should never use less than a 10ml syringe)
- Blunt fill needles x1 (blunt filtered needle if to access glass vial with snap top)

- 2% chlorhexidine gluconate in 70% isopropyl alcohol mop
- 2% chlorhexidine gluconate in 70% isopropyl alcohol wipes x1
- Bionector
- A blue vacutainer connector
- Vacutainer
- Blood sampling bottles
- Flushing solution 10mls (for example sodium chloride 0.9%)
- Prepared medication for bolus or infusion as required.
- Heparin lock as prescribed (if required)

Procedure:

Action	Rationale
Explain and discuss the procedure with the patient. Obtain informed consent for the procedure (wherever possible).	Inform and reassure the patient. To obtain the patient's consent and co-operation.
Carefully wash hands using liquid soap and water and dry thoroughly.	To minimise the risk of infection.
Clean the trolley (tray) with soap and water followed by a recommended alcohol wipe and allow to air dry.	To minimise the risk of infection.
Collect the required equipment, check packing and expiry dates and place the equipment on the bottom shelf of the dressing trolley.	To ensure that time is not wasted and that the procedure goes smoothly without unnecessary interruptions. To check that no equipment is damaged or out of date.
Identify the patient and ensure they are appropriately positioned to aid access to the Tunnelled catheter and ensure patient and operator comfort.	To ensure correct identification of the patient and patient safety and prepare the patient for the procedure.
Assess the Tunnelled catheter exit site to ensure no infection or swelling around site.	Infection around site would need reviewing prior to insertion. Accessing the tunnelled catheter should be avoided and antibiotic prescribed.
Decontaminate hands with alcohol hand gel until dry.	Hands may have become contaminated by handling the outer packs.
Open the sterile dressing pack on to trolley.	To create a sterile field.
Attach a yellow clinical waste bag to the side of the trolley below the level of the top shelf.	To ensure contaminated material is below the level of the sterile field.
Open equipment required on to the sterile field.	To ensure all appropriate equipment for the procedure is available.

Action	Rationale
	
Decontaminate hands with alcohol hand gel and rub until dry.	Hands may have become contaminated by handling the outer packs etc.
Put sterile gloves and use sterile towel to rest lumen on.  Remove old NFC and clean the end of the tunnelled catheter with the 2% chlorhexidine gluconate in 70% isopropyl alcohol wipe for 30 seconds and allow to air dry. Then attach the new NFC. Ensure ANTT is applied at all times.	To reduce infection and Minimise the risk of contamination. Towel acts as a clean field. NFC's need replacing once a week to help reduce infection. NFC is a needle-free device which reduces microbial ingress and is a straight fluid pathway with neutral displacement.
(If the NFC does not require changing). Clean the NFC with the 2% chlorhexidine gluconate in 70% isopropyl alcohol wipe for 30 seconds and allow to air dry. 	Ensure friction is created when wiping to remove microorganisms using different areas of the wipe ensure less contamination.
Using ANTT attach the 10ml syringe and draw back 5-10mls of blood and re-clamp line. (Unless obtaining blood cultures in which case follow procedure below for blood sampling) Discard syringe into a yellow sharp bin	ANTT to ensure no transition of microorganisms. 5-10mls of blood withdrawn to ensure there is no contaminated blood containing saline/heparinised saline which could cause inaccurate blood results.
For Blood Sampling: Attach vacutainer and unclamp line. Insert the blood bottles in required order for sampling. If taking blood cultures,	A secure safety device for taking bloods that ensure staff do not use needle and syringes, reducing risk of needle stick injuries.

Action	Rationale
these samples should be taken first, without discarding 5-10mls blood Re clamp line.	Blood sampling – 1st- Biochemistry Gold top 2nd- coagulation Blue top 3rd- EDTA –purple top Samples taken in specific order to reduce contaminations of samples and then providing inaccurate blood results.
• Ensure you check patient details with patient. • Label the blood bottle by the patient. • Patients name/date of birth/hospital number (NHS number). Ensure the requesting bloods are correct and send as per local guidance.	Without correct patient details, the blood will be rejected. Staff should never pre label blood bottles or label away from patients as this is deemed unsafe practice and high risk for errors.
Attach 10ml syringe containing sodium chloride (w/v) 0.9%. Using a 'push/pause' or pulsating technique. Inject 1ml at a time. Observe the site for any swelling/pain and ensure the saline inserts smoothly.	To check the patency and correct positioning. 'Push/pause' or pulsating technique creates turbulence within the lumen(s) of the catheter, thereby decreasing the risk of fibrin and platelets becoming adhered to the internal wall of the catheter and minimising occlusion.
Administer the drug as protocol.	To carry out instructions as per the prescription.
INPATIENT: Flush with saline 10mls after each use. If line used less than 3 times in 24hrs flush with saline and heparinise as per local protocol. Heparinised saline 2-5mls using 10ml syringe. If the Tunnelled catheter is valved, then only a saline flush is required.	The act of flushing with saline has the purpose of cleaning the internal walls of the lumen, as well as a key procedure of maintaining patency and preventing occlusion. Valved lines are not open-ended line and are only required to be flushed with saline, as recommended by manufacturer.
Out-patient: Flush with saline 10mls followed by Heparinised saline 2-5mls using 10ml syringe. Ensure that positive pressure is applied at the end of the 5ml flush	Locking Heparin into the Tunnelled catheter creates a column of fluid inside the lumen to maintain patency. Flushing and locking techniques are considered more important to prevent lines from occluding. Valved lines do not require Heparinised saline flushes.
Maintain pressure on the plunger as syringe is disconnected from NFC	To prevent backflow blood and possible clot formation.

Action	Rationale
Dispose of all sharps and equipment immediately as per local trust guidance.	To ensure patient and staff safety.
Remove gloves and apron and dispose of. Carefully wash hands using liquid soap and water and dry thoroughly.	To minimise the risk of contamination.
Document the procedure and record details of site assessment in the patient's records adhering to Trust Documentation Standards.	To ensure adequate records and enable continued care of device and patient.

Appendix 3: Procedure for the Management and Care of Peripherally Inserted Central Catheter (PICC)

Additional information:

Fixation / stabilisation device	Change as per manufacturer's recommendations, for adhesive devices this is generally every 7 days
Dressing/flushing and NFC change	Required every 7 days When patients are not having regular access for their line it is required to flush it weekly to ensure patency.
Some PICC lines are CT contrast injectable, usually represented by a purple colour	If not CT contrast injectable line, PICC should not be used for this purpose as this can cause the catheter to split.
Total parenteral Nutrition (TPN); if a double lumen catheter, one should be designated solely to TPN	To ensure bloods are not taken from the TPN lumen.
Patients should be advised not to swim or submerge their PICC in water. Covers can be purchased for use in the bath / shower	Due to the risk of infection.

Procedure for PICC line dressing change

Equipment:

- Hard surface (blue) tray (dressing trolley may be used if extra space is required)
- Apron
- Alcohol hand gel
- Sterile dressing pack with sterile gloves
- Nonsterile gloves
- 2% chlorhexidine gluconate in 70% isopropyl alcohol mop
- 2% chlorhexidine gluconate in 70% isopropyl alcohol wipes x1
- Sterile, transparent, semi-permeable CVAD dressing

Procedure:

Action	Rationale
Explain and discuss the procedure with the patient. Obtain informed consent for the procedure (wherever possible).	Inform and reassure the patient. To obtain the patient's consent and co-operation.
Carefully wash hands using liquid soap and water and dry thoroughly.	To minimise the risk of infection.
Clean the trolley (tray) with soap and water followed by a recommended alcohol wipe and allow to air dry.	To minimise the risk of infection.

Action	Rationale
Collect the required equipment, check packing and expiry dates and place the equipment on the bottom shelf of the dressing trolley.	To ensure that time is not wasted and that the procedure goes smoothly without unnecessary interruptions. To check that no equipment is damaged or out of date.
Identify the patient and ensure they are appropriately positioned to aid access to the PICC and ensure patient and operator comfort.	To ensure correct identification of the patient and patient safety and prepare the patient for the procedure.
Decontaminate hands with alcohol hand gel until dry.	Hands may have become contaminated by handling the outer packs.
Open the sterile dressing pack on to trolley.	To create a sterile field.
Attach a yellow clinical waste bag to the side of the trolley below the level of the top shelf.	To ensure contaminated material is below the level of the sterile field.
Open equipment required on to the sterile field.	To ensure all appropriate equipment for the procedure is available.
Decontaminate hands with alcohol hand gel and rub until dry.	Hands may have become contaminated by handling the outer packs etc.
Observe exit site and if red or of concern take a swab and escalate possible infection.	To ensure exit site is not infected and patient requires antibiotics.
Put on none-sterile gloves and remove dressing covering the PICC line When removing the dressing gently pull away from you. Be careful not to remove the fixation device / move the PICC line position while removing dressing Clean the skin with 2% chlorhexidine gluconate in 70% isopropyl alcohol mop for 30 seconds, then allow to dry. Clean the line with 2% chlorhexidine gluconate in 70% isopropyl alcohol wipe going from the exit site at the patient down towards the NFC	Take into account patients with a history of steroid medications and those with visibly thin, fragile skin. Special care should be given to application and removal. The pressure applied increases the skin surface area contact with the adhesive, and so greater pressure applied will increase the tension needed to remove the dressing and the stripping effect upon the patients' skin. To minimise the risk of contamination and destroy skin flora. By wiping away from the patient reduces the risk of infection around exit site. To Minimise the risk of contamination and destroy skin flora.
Apply sterile gloves to redress the PICC using a sterile transparent semi-permeable dressing, covering the exit site of the line. The remainder of the line can be taped on top of the dressing in a comfortable position for the patient	Dressings must be changed every 7 days or earlier if they become loose or there is blood or moisture build up There is consensus across international guidance for the use of semipermeable clear dressings. If possible, with integral or separate chlorhexidine and fixation. These are proven to reduce incidence of line –

Action	Rationale
	related infection, having a clear dressing allows observation of the entry site at all times. If gauze dressings are required, they need to be changed daily due to not being water repellent.
Remove gloves and apron and dispose of. Carefully wash hands using liquid soap and water and dry thoroughly.	To minimise the risk of contamination.
Document the procedure and record details of site assessment in the patient's records adhering to Trust Documentation Standards.	To ensure adequate records and enable continued care of device and patient.

Procedure for accessing, blood sampling and flushing a PICC line

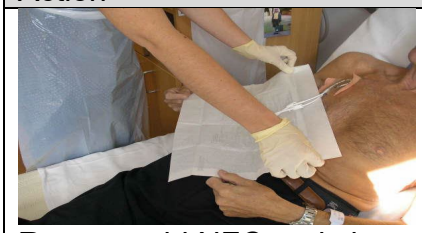
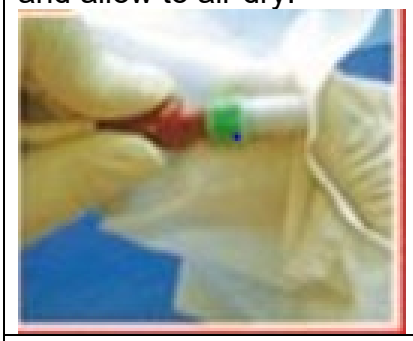
Equipment:

This is to flush 1 lumen of a PICC line, if there are two lumens additional equipment may be required.

- Hard surface (blue) tray (dressing trolley may be used if extra space is required)
- Apron
- Alcohol hand gel
- Sterile dressing pack with sterile gloves
- Nonsterile gloves
- 3x10ml syringes (you should never use less than a 10ml syringe)
- Blunt fill needles x1 (blunt filtered needle if to access glass vial with snap top)
- 2% chlorhexidine gluconate in 70% isopropyl alcohol mop
- 2% chlorhexidine gluconate in 70% isopropyl alcohol wipes x1
- NFC
- A blue vacutainer connector
- Vacutainer
- Blood sampling bottles
- Sterile, transparent, semi-permeable CVAD dressing
- Flushing solution 10mls (for example sodium chloride 0.9%)
- Prepared medication for bolus or infusion as required.
- Heparin lock as prescribed (if required)

Procedure

Action	Rationale
Explain and discuss the procedure with the patient. Obtain informed consent for the procedure (wherever possible).	Inform and reassure the patient. To obtain the patient's consent and co-operation.
Carefully wash hands using liquid soap and water and dry thoroughly.	To minimise the risk of infection.
Clean the trolley (tray) with soap and water followed by a recommended alcohol wipe and allow to air dry.	To minimise the risk of infection.
Collect the required equipment, check packing and expiry dates and place the equipment on the bottom shelf of the dressing trolley.	To ensure that time is not wasted, and that the procedure goes smoothly without unnecessary interruptions. To check that no equipment is damaged or out of date.
Identify the patient and ensure they are appropriately positioned to aid access to the PICC line and ensure patient and operator comfort.	To ensure correct identification of the patient and patient safety and prepare the patient for the procedure.
Assess the PICC line exit site to ensure no infection or swelling around site.	Infection around site would need reviewing prior to insertion. Accessing the PICC should be avoided and antibiotic prescribed.
Decontaminate hands with alcohol hand gel until dry.	Hands may have become contaminated by handling the outer packs.
Open the sterile dressing pack on to trolley.	To create a sterile field.
Attach a yellow clinical waste bag to the side of the trolley below the level of the top shelf.	To ensure contaminated material is below the level of the sterile field.
Open equipment required on to the sterile field. 	To ensure all appropriate equipment for the procedure is available.
Decontaminate hands with alcohol hand gel and rub until dry.	Hands may have become contaminated by handling the outer packs etc.
Put sterile gloves and use sterile towel to rest lumen on.	To reduce infection and minimise the risk of contamination. Towel acts as clean field.

Action	Rationale
 Remove old NFC and clean the end of the tunnelled catheter with the 2% chlorhexidine gluconate in 70% isopropyl alcohol wipe for 30 seconds and allow to air dry. Then attach the new NFC. Ensure you use the ANTT at all times.	NFC's need replacing once a week to help reduce infection. NFC is a needle-free device which reduces microbial ingress and is a straight fluid pathway with neutral displacement.
(If the NFC does not require changing). Ensure you clean the NFC with the 2% chlorhexidine gluconate in 70% isopropyl alcohol wipe for 30 seconds and allow to air dry. 	Ensure friction is created when wiping to remove microorganisms using different areas of the wipe ensure less contamination.
Using an ANTT attach the 10ml syringe and draw back 5-10mls of blood and re-clamp line. (Unless obtaining blood cultures in which case follow procedure below for blood sampling) Discard syringe into a yellow sharp bin	ANTT to ensure no transition of microorganisms. 5-10mls of blood withdrawn to ensure there is no contaminated blood containing saline/heparinised saline which could cause inaccurate blood results.
For Blood Sampling: Attach vacutainer and unclamp line. Insert the blood bottles in required order for sampling. If taking blood cultures, these samples should be taken first, without discarding 5-10mls blood Re clamp line (if clamp present).	A secure safety device for taking bloods that ensure staff do not use needle and syringes, reducing risk of needle stick injuries. Blood sampling – 1st- Biochemistry Gold top 2nd- coagulation Blue top 3rd- EDTA –purple top Samples taken in specific order to reduce contaminations of samples and then providing inaccurate blood results.

Action	Rationale
• Ensure you check patient details with patient. • Label the blood bottle by the patient. • Patients name/date of birth/hospital number (NHS number). Ensure the requesting bloods are correct and send as per local guidance.	Without correct patient details, the blood will be rejected. Staff should never pre label blood bottles or label away from patients as this is deemed unsafe practice and high risk for errors.
Attach 10ml syringe containing sodium chloride (w/v) 0.9%. Using a 'push/pause' or pulsating technique. Inject 1ml at a time. Observe the site for any swelling/pain and ensure the saline inserts smoothly.	To check the patency and correct positioning. 'Push/pause' or pulsating technique creates turbulence within the lumen(s) of the catheter, thereby decreasing the risk of fibrin and platelets becoming adhered to the internal wall of the catheter and minimising occlusion.
Administer the drug as protocol.	To carry out instructions as per the prescription.
INPATIENT: Flush with saline 10mls after each use. If line used less than 3 times in 24hrs flush with saline and heparinise as per local protocol. Heparinised saline 2-5mls using 10ml syringe. (If the PICC is a Valved catheter then only a saline flush is required)	The act of flushing with saline has the purpose of cleaning the internal walls of the lumen, as well as a key procedure of maintaining patency and preventing occlusion Valved lines are not open-ended line and are only required to be flushed with saline, as recommended by the companies.
Out-patient: Flush with saline 10mls followed by Heparinised saline 2-5mls using 10ml syringe or as per local protocol. Ensure that positive pressure is applied at the end of the 5ml flush	Locking heparin into the PICC line creates a column of fluid inside the lumen to maintain patency. Flushing and locking techniques are considered more important to prevent lines from occluding. Valved lines do not require heparin saline flushes.
Maintain pressure on the plunger as syringe is disconnected from injection cap.	To prevent backflow blood and possible clot formation.
Dispose of all sharps and equipment immediately as guidance.	To ensure patient and staff safety.
Remove gloves and apron and dispose of. Carefully wash hands using liquid soap and water and dry thoroughly.	To minimise the risk of contamination.
Document the procedure and record details of site assessment in the patient's records adhering to Trust Documentation Standards.	To ensure adequate records and enable continued care of device and patient.

Appendix 4: Complications of a central venous access device

Detection and Management of Complications

Before insertion the patient must be fully aware of the potential complications of insertion and continued management.

Occlusion

Prevention of occlusion can be achieved by correct use of flushing techniques and solutions, correct frequency of flushing, and not allowing infusions to 'run dry'. A PWO (persistent withdrawal occlusion) occurs when a line flushes but blood return is absent. Absence of blood return requires further investigation to verify tip position. This may involve radiological investigation in the first instance, or a fluid 'challenge' of 250ml of saline over 15 minutes.

PWO may be resolved using a fibrinolytic agent such as Urokinase (5000iu in 2ml) Only 10ml syringes or larger should be used, and the Urokinase instilled into the line for 60 minutes then blood withdrawal attempted again. This can be repeated as necessary; if still no blood return, radiological investigation will be required.

If a total occlusion does occur, Urokinase (5000iu in 2ml) can be instilled to unblock the device using the three-way tap method. This involves using an empty syringe to draw back 2mls with the tap open to the line, then closing the three-way tap creating negative pressure in the lumen of the line. Once the three-way tap is then opened to a syringe containing 2ml Urokinase, the solution will get drawn into the line.

Never use small syringes (under 10ml) as this causes damage to the catheter e.g., splitting.

Infection

Prevention of infection is key throughout care and management of CVADs - use of aseptic technique, use of correct cleaning products – and timings, regular site inspection and dressings changed according to policy, use of antimicrobial impregnated patches / impregnated catheters. Sutures can increase risk of infection.

If a patient develops a local site infection, then a swab should be taken, and the patients commenced on antibiotics. If the patient has signs and symptoms of a systemic infection and/or the patient has a rigor when flushing the CVAD then blood cultures should be taken from both the CVAD (all lumens) and a peripheral sample. The patient can then be commenced on antibiotics. The CVAD may need to be removed and the tip should be sent to microbiology.

Thrombosis

This can be prevented by correct tip placement and correct maintenance. If thrombosis occurs, it is recommended that the patient has an ultrasound to ascertain the size and location of the thrombosis and then is commenced on anticoagulant therapy. If patients

have any haematological conditions that may have resulted in the thrombosis, then refer to haematologist for guidance. If a patient has a thrombosis but the catheter lumen is still patent, then it can be used for IV therapy. The exception to this would be if the thrombosis is occluding the tip of the catheter.

Damage / Fracture

Can be caused by pinch-off syndrome, excessive pressure or external trauma. A smooth clamp should be placed on the reinforced section to prevent wear and tear. Use of correct syringe size can also prevent trauma to the lumen; any syringe smaller than 10ml has the potential to create pressures that the line cannot withstand, and this may result in splitting of the line.

If a skin tunnelled catheter becomes damaged, then the line should be immediately clamped proximally to the split / fracture. Some lines can be repaired so consult your local line insertion team for advice. PICC lines generally require immediate removal if split / damaged.