Adult Venous Access Policy including the Care and Management Central Venous Access Devices (CVADs)

"Quality and safety for every patient every time"

Document Control

Prepared By	Issue Date	Approved By	Review Date	Version	Contributors	Comments/ Amendment
Sharon Harper	April 11	Chemotherapy Group		1.1	Chemo Nurse Group	
	12.10.11	NECN Core Chemo Team	12.10.13	1.2		
Wendy Anderson	18.09.13	Chemotherapy Group	18.09.15	1.3		Updated
Wendy Anderson	21.08.14	Chemotherapy Group Chair	Sept 2016	2.0	Chemo Nurse Group	Renamed and added section on cannulation as venous access
Wendy Anderson	19.01.18	Chemotherapy Group	January 2021	3.0	Kate Lockhart	Review Date Updated, rebranded to NCA, Details on PORT-A-CATH added

Contents

Network Policy for the Care and Management of Central Venous Access Devices in Adults.

1 Introduction & Principles of Management

This policy is not intended to be exhaustive and it is intended to complement rather than replace local trust policies, and all practitioners should be familiar with local policies related to the management and care of central venous catheters such as Infection control policies, IV drug administration, PPE etc. The purpose of this policy is to ensure minimum key standards of principles of safe practice when caring for central venous catheters within the Northern Cancer Alliance.

A Central Venous Catheter (CVC) provides venous access for patients requiring short/long term therapies. To many patients the catheter is an important lifeline, therefore it is imperative that the catheter is handled and maintained correctly.

The use of central venous access devices is a well-established practice in both primary and secondary care. The use of central venous access devices ensures appropriate venous access for patients requiring many different forms of treatments including chemotherapy, parenteral nutrition, IV antibiotic therapy, IV fluid replacement, blood product transfusion, venous blood sampling and measurement of central venous pressure. They can also be used for renal dialysis and bone marrow transplantation, as well as for patients with poor venous access.

Most of the guidance in this paper is based on national guidelines which have been taken from the Royal Marsden Manual for Clinical Nursing Procedure (2015) and EPIC3: National Evidence- Based Guidelines for Preventing Healthcare-Associated Infections.

The term Central Venous Catheter (CVC) refers to an intravenous catheter whose internal tip lies in a large central vein, access is usually via the superior or inferior vena cava. The femoral vein should be avoided. There are various types of CVC but common to all is the concept that the tip of the catheter floats freely within the bloodstream in a large vein parallel to the vein wall, so that blood flow is maximised, and physical and chemical damage to the internal walls of the vein are minimised.

Increasingly ultrasound guidance is being used to assist the experienced PICC placer in the placement of PICC's. This is particularly useful for patients who do not have palpable veins in the ante-cubital fossa region of the arm. This technique will not be discussed in this paper, refer to local policy for guidance.

2 Types of Catheter (note that you need to be aware of the type of line inserted prior to any care to the line.)

2.1 Hickman Line (Skin Tunnelled Catheter)

A silicone skin tunnelled catheter intended for long term access, usually one month to 2 years, and inserted into the superior or inferior vena cava or a large vein leading to these vessels. Many have a fibrous (Dacron) cuff, which sits in the skin tunnel. This enables the patients tissue to bond with the line, to create a secure fix, and will act as a mechanical barrier to prevent ascending bacteria. They are usually sutured or secured in place for three to six weeks until the bonding process is complete.

These lines have clamps for use when accessing the line to prevent air embolism and/or blood loss. Available in single, double and triple lumen, usually colour coded. The red or brown lumen is usually larger in size and is used for blood sampling. Each lumen provides independent access to the venous circulation so that incompatible drugs/fluids may be administered simultaneously. If a multi-lumen catheter is being used to give parenteral nutrition, one lumen must be dedicated for this purpose and labelled accordingly.

2.2 Groshong Line

A translucent or blue silicone, thin walled, blunt tipped, cuffed skin – tunnelled catheter. The line has a radiopaque stripe and an attachable suture wing. The line has a patented three-position valve, which prevents the need for a clamp. Available in colour coded single and double lumen. The red lumen is used for blood sampling. Heparin solution is not required when flushing Groshong lines, as the integral valve prevents blood reflux into the catheter lumen.

2.3 Peripherally Inserted Central Catheters (PICC Lines)

Intended for mid-long term use (up to 6 months, sometimes longer). Unlike tunnelled catheters PICC's do not possess a 'cuff' to secure the catheter. They are secured to the skin using steristrips or a Statlock or a Securicath securing device.

There are several types of PICC lines in common usage.

1. Bard Groshong PICC lines

A translucent silicone, thin walled, blunt tipped catheter. The line has a radiopaque stripe and depth markings and an attachable suture wing. There is an attachable suture wing for skin fixation. The line has a 3-position valve, which prevents the need for a clamp, as the integral valve prevents blood reflux into the catheter lumen.

2. Bard Power PICC lines which are designed for multiple clinical indications and which enable the rapid administration of CT contrast. This is a valued line which also prevents the need for a clamp at the integral valve prevents blood reflux into the catheter lumen. These PICC lines can be flushed with saline only.

3. Vygon PICC lines

A polyurethane, thin walled, open-ended catheter. The line is depth marked 60 cm catheter.
A PICC should not be confused with a Midline catheter which is usually 20cm long with the tip terminating in the region of the axillary vein and is designed for short term peripheral drug delivery. A Midline catheter is not a central venous catheter. However the principles for care of midline catheters is comparable with central catheters.

Non tunnelled catheters are more commonly found in acute settings and only suitable for short term use, they are sometimes called long lines or central lines. Implantable ports such as Port-a-caths are commonly used in childrens cancer settings.

2.4 PORT-A-CATH

Intended for mid-long term use, are totally implantable devices, with the entire access system implanted under the skin. There are three venous access systems, PORT-A-CATH, PORT-A-CATH II and ProPort. Each consists of a titanium or plastic portal with a self-sealing silicone septum and a catheter made of either silicone or polyurethane.

All are implanted, used and maintained in the same way. They are accessed for injection or infusion by percutaneous puncture using a sterile, non-coring PORT-A-CATH needle.

3 Choice of catheter

The choice of device will depend chiefly on the purpose for which it is intended, though patient preference may be a key factor with long-term catheters. As a general principle the lumen diameter and the number of lumens should be kept to a minimum, since larger bore catheters and multiple lumens are associated with higher infection and thrombosis risks. If intended for the administration of ambulatory chemotherapy a single lumen line should suffice. Clearly there are many other factors to be weighed against the risks – e.g. in high dependency settings large bore catheters and multiple lumens tend to be used as they are essential for management of the acutely ill patient. Where Parenteral Nutrition is to be administered, ideally a single-lumen catheter should be used. If multiple lumens are essential, then one lumen should be dedicated “exclusively for that purpose”. PORT-A-CATH can be advantageous as the entire access system is implanted under the skin

It is important to ensure an optimal match between patient and catheter choice. Consider the diagnosis and prognosis especially taking into account conditions that

may prevent vascular access e.g. radiotherapy skin reactions or previous multiple peripheral cannulations. Finally consider patient lifestyle.

4 Catheter insertion

Catheters are inserted by medical or nursing staff (who have undergone relevant theory and practical training and are deemed competent) in theatre areas, radiology departments, designated clinical areas or at the bedside. The insertion of a skin tunnelled catheter is a surgical procedure usually carried out in the operating theatre or designated area under strict aseptic conditions.

The catheter should be inserted using an aseptic technique. Potential complications associated with the insertion of the catheter include:

Pneumothorax
Venous air embolism
Arterial puncture
Catheter misplacement
Cardiac Tamponade
Cardiac arrhythmia's
Catheter occlusion

A catheter placed in an optimal position will reduce potential complications.

When inserting the catheter the clinician will consider the following points:

- The catheter tip should lie above the junction of the SVC and right atrium
- If a cuffed catheter is used, the cuff should be placed in the mid point of the tunnel away from the exit site
- It is recommended that a Chest X-Ray should be performed to confirm the position of the catheter before use.

5 Hand Hygiene

The most common cause of the spread of nosocomial infection is via the hands of health care workers because of their inability to effectively decontaminate their hands. Therefore, the first crucial step in the reduction of catheter related sepsis is knowledge of the principles of hand hygiene and the effective use of disposable gloves.

Any procedure connected with an intravenous catheter requires the health care worker to wash with an antibacterial hand wash. The purpose of a hand wash is to remove dirt and to reduce the load of bacteria on the skin of the hands. Washing with soap and water will remove the transient bacterial flora, and washing with an antiseptic will reduce the resident bacteria on hands. It should be noted however, that resident bacteria would not be totally eliminated by hand washing.

Local hand washing guidelines should be followed.

5.1 The use of gloves

It is important that gloves are used in conjunction with hand hygiene and not as a replacement. Many health care workers believe that gloves protect staff and patients from cross contamination, but in reality this is not the case as hands can become easily contaminated under gloves when they are unwittingly punctured or when they are removed. The lack of evidence regarding the benefits of using sterile gloves has resulted in many teams developing procedures based on using an aseptic non-touch technique (ANTT).

6 Principles of Line Care

Central venous lines should be placed and cared for using aseptic techniques, wearing sterile gloves when carrying out dressing changes and when accessing the catheter.

Never use anything less than a 10ml syringe when administering or removing fluid/blood from a line.

Do not allow air to enter the catheter. All syringes and intravenous administration sets must be carefully primed to prevent air embolism. The negative pressure within the chest may suck air into the catheter during inspiration especially if the patient is sitting up.

Cap off the catheter as appropriate with a needle-free access device (e.g. Swanlock or Bionector). This will minimise interruptions to the closed system. Unless manufacturer's instructions vary, this should be changed every 7 days or every 100 uses, whichever is the sooner. In adult inpatients with long-term vascular access devices the bungs should ideally be changed on a set day to ensure continuity within and between units. The risk of contamination increases with every interruption to the closed system.

Whenever the bung/access device is removed from the catheter then it must be replaced with a new, needleless access device/bung to prevent infection and air embolism.

Always maintain pressure on the plunger as the syringe is disconnected from the cap then clamp the catheter if necessary to maintain positive pressure and prevent back flow of blood into the catheter, and possible clot formation.

If the catheter possesses an integral clamp, keep it closed whenever the cap is removed and at all other times except when administering or withdrawing fluids. Clamping should always take place at the designated area and never at the thickened area near the hub (except Hickman lines). The clamp will prevent air entry and bleeding should the luer lock cap/bionector become unattached. Repeated clamping away from the specially reinforced area may result in damage to the catheter.

Should the catheter fracture or be accidentally cut, clamp it without delay proximal to the break. Specialist advice should be sought immediately to consider removal or repair of the catheter to prevent haemorrhage, air embolism and infection.

Always secure the catheter firmly to the skin away from the exit site with tape or with a dedicated device such as 'Statlock' (for PICC lines) to prevent tension or accidental dislodgment.

Only use PORT-A-CATH needles when accessing the PORT- A-CATH portal. Do not use standard hypodermic needles, as they damage the septum.

7 Accessing the Catheter

Before it is used for administering therapeutic drugs or fluids, the patency and correct functioning of the catheter should be established.

The needle-less cap should be cleaned thoroughly using chlorhexidine in 70% alcohol and allowed to air dry. Apply with friction, rubbing the cap in a clockwise and anti-clockwise manner at least five times to minimise the risk of contamination at the connections.

The portal septum of a PORT-A-CATH should be prepared by starting over the centre, moving outwards in a circular motion, covering an area of approximately 4-5 inches in diameter and repeating the process three times. Chlorhexidine in 70% alcohol with 2% chlorhexidine gluconate should be used and the area allowed to air dry.

Signs of catheter occlusion, whether partial or complete, should be taken seriously and action should be taken earlier rather than later to restore full patency. Ignoring the early signs may lead to the development of more serious problems which cannot then be easily rectified – e.g. complete blockage or thrombosis.

Nurses using CVCs can be confident of access if all three of the following apply

The catheter can be flushed with ease. Blood can be withdrawn from the catheter
The patient experiences no discomfort during flushing/infusion and there are no other complications

A proper assessment of the catheter involves observing the exit site and the area around as this may reveal any signs of thrombosis, leakage, infection etc.

Checking for flashback of blood does not necessarily mean you have to discard blood*. For example, attach a syringe containing 10ml 0.9% sodium chloride to the catheter, flush a couple of ml into the line and then withdraw. As soon as you see a trace of blood in the catheter or syringe just flush the rest of the sodium chloride into the line using the push-pause technique. *(unless local practice guidelines differ)

Never use a PICC line for administering contrast medium as this will cause the PICC to split, unless using a PowerPICC.

Only PORT-A-CATH needles which are noncoring and nonsiliconised should be used with PORT-A-CATH. Straight needles are typically used for bolus injections, 90 degree bend needles for extended or continuous infusions. Always access the portal at a 90 degree angle to the septum. Insert the needle until you feel the bottom of the portal and the smallest gauge needle necessary for the therapy delivery should be chosen.
The needle length should be long enough to reach the bottom of the portal when inserted and when using a 90 degree bent needle or winged infusion set, the needle hub should lie flush against the skin surface.

8 Flushing Technique

Do not use syringes smaller than 10 ml for infusion into the catheter, to prevent excessive pressure being exerted on the lumen which might cause it to rupture. Smaller syringes exert greater pressure.

Use a brisk 'push-pause' flushing technique routinely when flushing the catheter - i.e. flush briskly, pausing briefly after approximately each ml of fluid. The 'push-pause' technique causes turbulence within the catheter, which helps to flush away any debris and prevent occlusion of the lumen.

If the catheter possesses a clamp, clamp the line while the final ml of the flush is being injected. If there is no clamp you can achieve a “positive pressure finish” by removing the syringe from the Swanlock (or similar) while injecting the last ml: but note that to avoid any spray from the syringe you should hold sterile gauze around the connector while doing this. This helps prevent blood entering the catheter after flushing, which might lead to occlusion or thrombus formation.

The patency of each CVC lumen should be assessed prior to flushing or administering drugs.

Unused Hickman lines should be flushed weekly with a ‘Heparin lock’. (Guidelines for flushing solution, volumes, concentrations and frequency of flushing should be available in local policies and guidelines). Note that the line should be clamped between syringe changes.

Use 0.9% Sodium Chloride between infusions/after blood sampling/incompatible drugs (or suitable alternative if 0.9% Sodium Chloride incompatible).

Unused PICC lumens should be flushed weekly with 0.9%Sodium Chloride.

Unused PORT-A-CATHs should be flushed 4 weekly with 20 ml 0.9%Sodium Chloride then 5ml of heparin solution (100IU/ml).

9 Procedure for Taking Blood from Central Venous Catheters

Blood samples should not be taken routinely from a CVC except in specialist areas where a local policy applies.

If line sepsis is suspected blood cultures will be required to be taken from the CVC following peripheral blood cultures which should be taken first (to prevent possible flushing of micro-organisms into the systemic circulation). When blood cultures are taken the initial 6-10 mls of blood should not be discarded as would be practice in case of blood sampling.

Blood samples should not be taken through a lumen that has recently been used for the administration of drugs or fluids as it could result in inaccurate blood results. Therefore infusions should be stopped prior to blood sampling for at least one full minute.

10 Care of the Exit Site

Dressings immediately post insertion

As with any surgical wound, the exit site should ideally be left undisturbed for 1-2 days. Routine taking down of the dressing post-insertion to inspect the site merely exposes the patient to increased risk of infection. On the other hand most exit sites bleed to some extent following insertion. If this leads to “strike-through” on a dry dressing, (i.e. exudate/blood/serous fluid observed on the outside of a dry dressing) it should be changed immediately since a wet surface provides a liquid pathway for bacteria to travel to the wound.

The entry site sutures (if non dispersible) may be removed after 7 days and the exit site sutures should be removed usually after 21 days when the catheter is secured with the bonding between the cuff and the fibrous tissues has taken place.

The ideal dressing immediately post-insertion is a dry dressing covered and sealed with a transparent dressing (Tegaderm). Ideally this dressing should be left undisturbed for at 1-2 days, however if there is any bleeding and the gauze becomes soggy the dressing should be changed.

If the exit site is reddened, painful, exudating or infected, increase the frequency of dressing change depending on the amount of exudate.

No dressing.

This may be suitable for some patients with Tunnelled CVCs from 21 days post insertion once the tissues have fibrosed around the cuff and in the absence of exudate or signs of infection, but follow local policy for guidelines.

PORT- A- CATH do not require a dressing.

11 Cleaning of Exit Site

At dressing changes, the exit site should be cleaned using sterile gauze and chlorhexidine 2% in 70% Isopropyl Alcohol (refer to local policy, usually Chloraprep) using an outward spiral motion to avoid transferring bacteria to the exit site. The site may require cleansing with soaked gauze prior to using the Chloraprep.

Cleaning should be carried out using an aseptic technique.

Loose blood, exudate or other debris which might provide a focus or infection or might impair inspection of the wound should be gently removed.

12 Removal

Consider removal if the line is not being used regularly.

PICC's can generally be removed by registered nursing staff that have undergone training and deemed competent to undertake the procedure. The patient should be lying/sitting with the PICC exit site below the level of the heart to help prevent air embolism. The line should be pulled out slowly and gently, the tip should be sent for culture if infection is suspected.

Tunnelled lines and PORT-A-CATHs require surgical removal at an appropriate location but refer to local policy for guidelines.

13 Cather occlusion.

The occlusion of central venous catheters is not uncommon and can usually be identified as originating from:

- External compression of the catheter wall
- Mechanical obstruction of the catheter lumen by drug precipitate, clotted blood or lipid deposits.

Unless catheter removal is an option, the cause must be identified and treated, even in the case of single lumen failure in multi-lumen catheters. The increased infection risk posed by blocked catheters necessitates treatment.

Catheter occlusion is the most common non-infectious complication of central venous access catheters and can occur as a result of intra-luminal clotting of blood, intra-luminal precipitates, fibrin sheath formation, pinch-off syndrome or mechanical factors such as constricting sutures and kinking of the catheter.

13.1 Prevention

- Position dressings and line to prevent kinking or external pressure of catheter wall.
- Flush catheters immediately upon completion of all infusions and injections, as per policy.
- When not in use, catheters should be flushed as per manufacturer's instructions either using Hepsal10 units/ml to flushPICC or skin tunnelled catheters, 5mls for PORT-A-CATHs according to protocol.

13.2 Diagnosis and Management

Occlusion should be suspected if unable to aspirate blood and/or flush a central line Sometimes positional change is sufficient;

- Ask the patient to change position e.g. sit forward or back.
- Ask the patient to lift their arm up and down
- Ask the patient to cough
- Ask the patient to breathe deeply

Check the external portion of the catheter for kinking, compression or positional occlusion.

Attempt to carry out procedure for obtaining blood and or flushing central lines
Do not use force to flush the catheter as this could result in catheter rupture or dispersal of the clotted material into the systemic circulation. Syringes less than 10mls should not be used.

Arrange for CXR to confirm correct or incorrect tip position
If correct tip position is confirmed, attempts to aspirate occlusion material using a 10 ml syringe loaded with 5 ml of Heparin Sodium 10 units/ml will be made.
If unsuccessful in aspiration appropriate de-clotting agents may be administered in accordance with the Trust Procedure for De-Clotting Central Venous Catheters.

It is important to attempt to identify the reason for catheter occlusion prior to commencing the de-clotting procedure.

This procedure applies to catheters that are occluded as a result of blood clot, precipitate or fibrin sheath formation. Catheters may only be partially occluded or display withdrawal occlusion only but will still benefit from de-clotting to improve patency.

Following the above investigations and management a central line which remains patent for flushing but not for aspiration of blood will not be removed. Documentation will reflect that the above investigation and management has taken place and that the positioning of the catheter is correct despite the inability to aspirate blood.

14 Discharging patients home with a central venous catheter in place

Some patients will be receiving ambulatory chemotherapy so discharged home with a central line in place. These patients must also receive adequate information about early signs of phlebitis and what to do in the event of accidental dislodgment or removal of the line. The discharge planning process should include assessment of the patients manual dexterity, physical and medical condition as well as the home environment. It is essential to recognise the patients' needs and limitations. All patients must be discharged with contact name and numbers. District Nurses may be involved in caring for the line in the community and initial training/support may be required.

Patients/carers who have agreed to care for the line and would be flushing and /or dressing the line themselves should have additional guidance provided to support this:

Provision of a 24 hour contact number if they have any worries about their line.
Information regarding activities and possible restrictions that are applicable with day to day acitivities of having a line in place.
Information on when they should contact the hospital eg signs of possible infection, pain at exit site.

15 Use of Peripheral Cannula for Venous Access

A peripheral cannula can be used for bolus injections and short infusions of both vesicant and non vesicant drugs. The use of the shortest cannula with the smallest bore i.e. 22 or 24 gauge, non-ported plastic cannula are recommended as they cause least pain to the patient and help to preserve vein integrity.

The site of cannulation is very important. The site of choice is normally the large veins in the forearm, followed by the dorsum of the hand then the wrist. Where possible, areas to avoid include the anticubital fossa region, areas on joint flexion, lower limbs and sites distal to recent cannulation, lymphoedema, surgery, radiotherapy or venepuncture.

A clinical assessment may be required if repeated use of the above veins is deemed necessary, considering the risks of doing so versus the choice of a central venous access device.

The vein should always be palpated before cannulation is attempted. Bruised or inflamed areas should be avoided. Ideally, the vein should be distal, visible, palpable and superficial. Soaking the patients arm in hot water, applying a heat pad to the dorsum of the hand may help to dilate veins and may aid in difficult cannulations.

A competent practitioner should only make two attempts to cannulate a patient and then seek assistance from a colleague.