

Central Venous Line (CVL / PICC)

Central Venous Line (CVL)

Central Venous Line refers to an intravenous catheter where the tip lies in a large central vein and can be used to administer fluids or medications. Insertion of a CVL is done by trained medical personnel in hospital and is often left *in situ* for the administration of medications in the community.

Referral is usually from Outpatient Intravenous Antibiotics Service OPIVA (Auckland area), Outpatient Antimicrobial Therapy OPAT (Canterbury Area), Hospital in the Home HIH (other areas of NZ) Abbreviations are referred to in this document please refer to the referral source for who to contact for advice and in an emergency.

The following details are required:

- Type of vascular access. Commonly used in the community is a PICC – Peripherally inserted central venous catheter.
- Insertion site.
- Date of insertion.
- Catheter length if the line has been trimmed.
- Measurement of any external catheter exposed.
- Tip placement. Post insertion tip placement has been verified by X-ray.

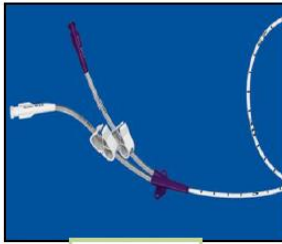
There are different types of CVLs:

- Non-tunnelled CVL – used mainly in acute settings and not suitable for long term.
- Tunnelled CVL (Hickman Line) – for long-term use and are inserted via the subclavian, jugular or femoral veins. The catheter is tunnelled subcutaneously and usually exits the chest wall where it is sutured. The catheter is cuffed to stop dislodgement.
- Implanted Central Venous Device (ICVD) Port-a-caths. For long-term use and intermittent use. The catheter exits in a self-sealing injection port implanted subcutaneously under the skin.
- Haemodialysis CVL – Non-tunnelled or tunnelled. For clients requiring haemodialysis. They have a larger lumen size and the catheter tip is different so blood can be withdrawn and returned via different lumen.
- PICCs are intended for mid-to-long term use in clients who require intravenous therapy; the tip usually resides in the lower third superior vena cava. Generally they are not sutured in place but secured by a statlock fixing device. They can be left *in situ* for up to 1 year.

These are most commonly seen in the clients we visit in the community.

All PICC lines managed in the community must have a positive fluid displacement needleless injection port.

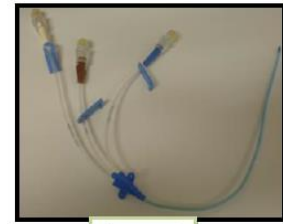
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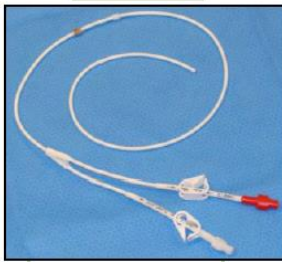
PICC



DIALYSIS/APHERESIS



CVC



Hickman®



Implanted port

Source: CDHB

CVL Patency

CVL are flushed to maintain patency. This should be carried out prior to administration of medications to check catheter patency, following the completion of medication and fluid administration and in between medications. The flushing technique used is a pulsatile flushing technique (push pause). This technique creates fluid turbulence inside the catheter lumen to possibly remove precipitate adhering to the intraluminal wall of the catheter and to promote catheter patency.

CVLs are assessed for patency by aspirating for blood.

- If you can't aspirate blood try changing the client's position, side to side, head down, arm placed above the head. Try asking the client to cough or take a deep breath then attempt to withdraw blood.
- Gently try to flush with 10mls 0.9% Sodium Chloride and aspirate. You may repeat this several times.
- If still no flashback and there is no resistance, flush the CVL as per instructions.

All CVL clients in the community should be reviewed to establish if the CVL is still required on each occasion it is accessed and at least weekly if not accessed.

In the community the insertion site may be checked by the RN, client or caregiver. The insertion site is to be monitored visually by client and/or caregiver at least 4 hourly for evidence of catheter related complications.

Hands must be washed or hand gel used prior to accessing any CVL to prevent catheter related infections.

Sterile gloves must be worn when (the IV system is open):

- Changing the injection port
- Changing the dressing
- Accessing and de-accessing implanted CVL
- Changing an extension set on a PICC line.

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When the IV system is closed clean gloves must be worn:

- Administering medications or fluids through the injection port
- Changing the IV tubing but not the injection port
- Changing the statlock when it is not under the PICC dressing

The CVL insertion site must be thoroughly cleaned with Chlorhexidine 2 % with alcohol and allowed to dry.

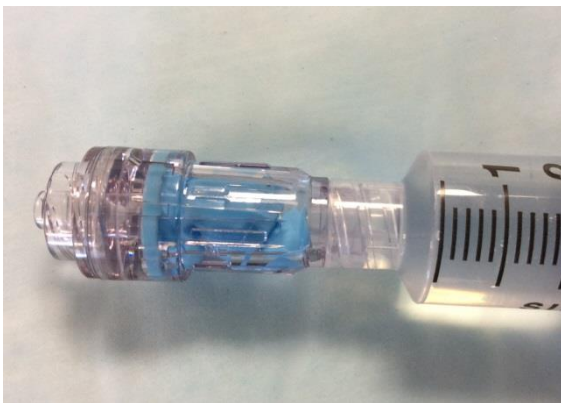
All catheter sites should be checked for:

- Bleeding
- Swelling
- Bruising
- Redness or signs of infection
- Induration
- leaking
- Pain or discomfort
- Dressing integrity
- Catheter securement device in place (statlock)
- Neck, shoulder and extremity on side of catheter insertion, should be checked for swelling, pain and thrombosis. PICCS also check upper arm, axillary area and hand for swelling or phlebitis.

Positive Displacement (PDAD) Access Device

All Central Venous Access devices must have positive displacement devices attached to the catheter hub. Some clients will be discharged from hospital care with these in place. At first visit change the access device to a PDAD if not already in situ.

- PICC lines are secured with a non- suture securement device called a statlock.
- Replace the securing device (statlock) as required if soiled or **EVERY 7 days** when dressing is changed).
- Use chlorhexidine impregnated dressing for all PICC clients unless client is allergic to chlorhexidine, then use IV3000 dressing and if client is allergic to IV3000 then daily sterile gauze dressing. Speak to your CNL/CTL/CMs if in doubt
- Measure catheter tip length to check for migration. Document the exact external length and take necessary action if there is a catheter tip migration of >2cm.
- Check for central venous line complications, signs and symptoms and intervene appropriately.



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PROCEDURE – Central Venous Catheter Site Care, Stabilisation Device (Statlock), Dressing & Positive Displacement Access Device (PICC).

Site care and dressing changes, including changing the injection port, shall be performed every 7 days and immediately if the dressing integrity becomes compromised, if moisture, drainage, or blood is present or dressing is fully saturated, or if signs and symptoms of site infection are present.

The positive displacement access device is to be changed every 7 days in conjunction with the dressing change or sooner if not visually clear of blood/fluids.

If it is known that an extension set was attached to the catheter at sterile insertion then it may remain for the life of the catheter; if this is unknown it should be changed with every dressing and port change. Vascular access device site care should allow for the observation and evaluation of the catheter skin junction and surrounding tissue. Please note that gauze dressings should be changed every 2 days (this is also when a TSM dressing is applied over gauze).

Gauze dressings are used if the client is allergic to the approved IV dressing or the dressing is not adhering to the skin. Gauze, bandages, or dressing material that may obstruct visualisation of the catheter-skin junction and/or constrict the extremity should not be used.

Equipment

- Hand hygiene
- 2% Chlorhexidine with alcohol swab stick
- 2% Chlorhexidine [and alcohol] skin swabs
- Clean Gloves
- Sterile Gloves
- IV transparent Tegaderm CHG dressing (chlorhexidine gluconate dressing) or if not available a suitable alternative PICC film adhesive dressing (e.g. S&N IV 3000 dressing)
- Stabilisation Device (e.g. Statlock)
- Positive Displacement Access Device (PDAD), extension set, injection cap, T-port or other catheter plug
- Dressing pack.

Procedure

1. Hand hygiene.
2. Prepare equipment aseptically.
3. Don clean gloves and carefully remove old dressing, removing in the proximal direction to reduce the risk of accidental removal of the catheter. Avoid tugging on the catheter or use of scissors or other sharp objects near the catheter. Remove Gloves.
4. Hand hygiene and don sterile gloves.
5. Using 2% chlorhexidine with alcohol swab stick, cleanse skin in a circular motion using friction from the insertion site working outwards – detach line from stabilisation device and remove from skin as per manufacturer’s instructions.
6. Pick up catheter line with one gauze, cleanse the catheter-skin junction, and swab down the line away from insertion site.
7. Allow to air dry for 15-30 seconds.

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8. Apply new stabilisation device if used – measure from catheter skin junction to top of stabilisation device clip.
9. Apply new sterile dressing over insertion site, catheter tubing, and hub.
10. If extension set and catheter plug are to be changed, clamp catheter.
11. Remove oldest, and swab catheter hub with chlorhexidine swab/cleanser using friction (15-30 seconds).
12. Allow to dry.
13. Ensure extension set is primed if using – attach new connector.
14. Inspect the catheter-skin junction for swelling, redness, or exudate. Assess external length of catheter to determine if migration of the catheter has occurred.
15. Measure length of PICC line from insertion site to hub and compare to length documented at insertion.
16. Label date and time and sign dressing.
17. Take temperature, and document.

The nurse should notify the Clinical Nurse Leader and the client’s medical practitioner immediately of any signs or symptoms related to CVAD dislodgement, migration, or malposition and obtain orders for diagnostic procedures. Procedures include, but are not limited to, chest radiograph and contrast injection through the catheter under fluoroscopy.

CVAD malposition and dislodgement may require a catheter exchange procedure or removal and insertion at a new site. CVAD migration and dislodgement increase the risk for thrombosis, thrombophlebitis, pericardial effusion, cardiac tamponade, and cerebrovascular accidents. If complications are present, the catheter should be removed and inserted at a new site if infusion therapy is to be continued.

PROCEDURE – Flushing Central Venous Catheters, Tunnelled Catheters PICC, and Groshong

Central venous catheters being used less frequently than 72 hourly are required to be flushed every 72 hours with Normal saline or frequency as prescribed.

Heparin Locking

Evidence suggests that using 0.9% normal saline is as equally effective as using Heparin flush and in light of potential risks associated with use of Heparin, is suitable for utilising as the preferred flushing solution for maintenance of short-term use central venous catheters (Mok et al, 2007) (Shallom et al, 2012).

Flushing with NaCl was shown to be more efficient when used in conjunction with positive displacement access devices (PDAD) and positive pressure technique. This prevents reflux of blood into the CVC and maintains patency of the line (Rodriguez, 2008). This reinforces the importance of ensuring that a PDAD is connected to the line. If not then the existing device must be replaced at the first visit with the approved PDAD.

The preferred solution for flushing CVCs is a minimum of 10mls 0.9% NaCL. (given all CVC lines will have PDADs).

Vascular access devices shall be flushed prior to each infusion as part of the steps to assess catheter function. Vascular access devices shall be flushed after each infusion to clear the infused medicine from the catheter lumen, preventing contact between incompatible medicines.

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10ml syringes or larger are recommended to be used to flush and administer medications. Smaller syringes generate greater pressure of pounds per square inch (psi) that if met with resistance along the fluid pathway increase the intraluminal pressure and cause catheter damage.

Never forcefully inject with any size of syringe, force applied to the syringe plunger meeting resistance inside the fluid pathway can lead to increase of intraluminal pressure causing catheter damage.

Equipment

- Non-sterile Gloves
- 2% chlorhexidine with alcohol wipes
- 10 mls syringes x 2
- 0.9% sodium chloride 10 ml amp

1. Hand hygiene.
2. Prepare equipment.
3. Don gloves.
4. Swab catheter plug with wipe using friction for 15-30 seconds.
5. Allow to dry
6. Attach flush with 10mls of 0.9% sodium chloride in a 10ml syringe. Slowly aspirate until positive blood return to confirm patency and flush with the attached syringe using the push pause technique.

COMPLICATIONS OF CENTRAL VENOUS LINES

- Infection
- Occlusion
- Thrombosis
- Catheter Migration
- Phlebitis
- Air Embolus.

Infection

Skin is the primary cause of catheter related infections. The source can either be from the client’s skin or from the hands of health care workers. Infection can be local or systemic.

The causes are:

- Poor hand hygiene
- Poor asepsis
- Suboptimal maintenance and care
- Type of catheter material and number of lumens
- Client co-morbidities e.g. immunosuppressed, neutropenic, poor nutrition, diabetes, renal failure, obesity, vascular disease, chronic infection, short bowel syndrome, oedema, poor hygiene.

Prevention/Detection:

- Monitoring for changes in vital signs
- Awareness of those most at risk
- Aseptic non touch technique

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- Vigorous cleaning of all catheter and infusion access ports, allowing time to air dry before connecting
- Dressing and catheter plug changes as per protocol
- Replacing the dressing or port if compromised.

Signs and Symptoms:

- Assess and monitor for redness or discharge from catheter exit site, neck and upper arm for swelling, pain or redness.
- Systemic changes – fever, hypotension, tachycardia, chills/rigors, vomiting.

Action:

- Notify OPIVA/OPAT/HH (referral source)
- A clinical decision may be made to remove catheter. A swab from insertion site and an X-ray may be ordered prior to this and antibiotics may be commenced
- Document all signs and symptoms and recordings.

Catheter Occlusion

Definition:

- Obstruction, partial or complete to the catheter limiting the ability to flush the catheter or administer medications or solutions
- This may be due to thrombotic or non-thrombotic or mechanic causes.

Prevention:

- Correct flushing and clamping technique
- Late recognition of problems
- Inadequate assessment of occlusions
- Ensure no kinking of tubing
- Tubing unclamping.

Signs and Symptoms:

- Resistance to flushing
- Unable to flush, complete occlusion.

Action: Try the following:

1. Deep breath – tip resting against vessel wall
2. Ask client to lie down
3. Get client to cough
4. Attempt to flush
5. If still unable to flush contact OPIVA/OPAT/HH.

Thrombosis

Definition:

- Clot in the vessel can be partial or complete occlusion.

Prevention:

- Correct flushing with sodium chloride 0.9% using turbulent flow flushing techniques (push pause).

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- Ensure positive pressure displacement valve *in situ*.

Signs and Symptoms:

- Swelling of limb, Neck swelling, Pain and inflammation Cool & dusky limb, resistance to flush, leaking from site.

Action:

- Do not administer medications. Ring OPIVA/OPAT/HH (referral source)

Catheter Migration

Definition:

- Movement of the catheter proximally or distally in the vessel.

Prevention:

- Correct securement device – statlock
- Effective Dressing
- Gentle flushing
- Care with dressing removal.

Signs and Symptoms:

- Inability to flush, leaking of IV solution of flushes at insertion site, reduced capability of line, Arrhythmias, Chest pain, line measurement is different from insertion measurements, Headache, Shoulder, Arm or Neck discomfort.

Action:

- Measure external length from PICC insertion to beginning of hub and compare to measurement records at insertion. Notify OPIVA/OPAT/HH if problems
- Do not administer any medications through the line.

Phlebitis

Definition:

- Inflammation or irritation of veins; this occurs with PICC lines. The irritation can be caused by the catheter of the PICC or manipulation of the PICC line on insertion.

Prevention/Detection:

- Reduce movement of the arm
- Assessment of arm and insertion site at every visit
- Dressing changes as per protocol including use of statlock to prevent catheter movement.

Signs and Symptoms:

- Redness and pain at site of cannulated vein
- Warmth
- Swelling of the upper arm, neck and shoulder
- Induration of the vein.

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Action: Notify OPIVA/OPAT/HH, they may instruct you to do the following:

- Get Client to rest and elevate the affected limb
- Apply warm compress to area. Instruct client or caregiver to do this for 15 mins approximately every 4-6 hours
- Ongoing monitoring of the site
- Document findings in the clinical note.

Cardiac Tamponade

Definition:

- Compression of the heart by an accumulation of fluid in the pericardial sac. Can be caused by migration of catheter into the pericardial.

Signs and Symptoms:

- Distended neck veins, tachycardia, Anxiety, Chest pain, Shortness of breath, Cyanosis, Dizziness, Confusion, Cardiac arrhythmias, Shock.

Action: This is a medical emergency. Dial 111

Air Embolism

Definition:

- Entry of air into the vascular system.

Causes:

- **Catheter fracture**
- Disconnection of IV administration set.

Signs and Symptoms:

- Hypotension, Tachycardia with low circulatory output. Agitation and/or confusion, Tachypnoea, pallor, Light-headedness.

Action: Call 111 for an ambulance. Place client in Trendelenberg position and place on left side (head 10 to 30 degrees down).

Prevention:

- Position client in supine position during CVL removal. Ask client to do valsalva manoeuvre or take a deep breath and hold during removal.
- Slowly remove catheter and place pressure over the exit site for 5mins.
- Always use leur lock syringes.
- Always clamp the catheter during access device PDD changes.

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