




GUIDELINE FOR PERIPHERALLY INSERTED CENTRAL CATHETER IN OLCCHC	
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INTRODUCTION

Central Venous Access Devices (CVAD), is a broad term used to include many catheter types which are inserted into a peripheral/central vein in the body to deliver medications or other therapies to children.

A catheter has one end positioned outside the body while a port is surgically placed under the skin and requires a special needle to access it.

The most common CVADs include:

- **Peripherally Inserted Central Catheter** inserted into one of the peripheral veins in the upper arm.
- **Central Venous Catheter**
- **Implanted ports** inserted into the subclavian or vein or jugular and attached to a fluid reservoir placed in a surgically created subcutaneous pocket in the upper chest or into an arm vein.
- **Hickman/Broviac catheter**
- **Permcath Catheter**
- **Umbilical Venous Catheter**

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Table 1. Skin Asepsis prior to peripheral and central line insertion by clinical staff in OLCHC

S.A.R.I. Guideline 2009- for prevention of infection associated with CVC or peripheral line insertion recommends chlorhexidine gluconate 2% in 70% isopropyl alcohol (in a single patient use application) in adults & **children ≥ 2 months**.

INDICATION	PRODUCT	COMPOSITION
Skin cleansing prior to peripheral canula insertion	Sanicloth®	↑
Skin cleansing prior to CVC insertion	OR	2% chlorhexidine gluconate in 70% isopropyl alcohol
Device cleaning (e.g. hubs)	Chlorhexidine 2% Alcohol (Ecolab) 200ml bottle	

For infants < **2 months old** the recommendation is 0.5% Chlorhexidine in aqueous solution

INDICATION	PRODUCT	COMPOSITION
Skin cleansing prior to peripheral and central line insertion in infants < 2 months old (Corrected age)	Sterexidine 200® 150ml bottle	Contains 0.5% Chlorhexidine Gluconate w/v in aqueous solution

NB: Use in premature babies:

In immature neonates (e.g.: below 30 weeks gestation), gently dab the product onto the skin for 10 seconds & allow the skin to dry in air. Avoid 'up & down, back & forth movement as gentle friction can damage immature stratum corneum of neonates. After the procedure, the skin should be cleaned with sterile water and dried thoroughly.

NOTE:

Povidone Iodine 10% (*Videne®* or *Betadine®*) may be used in patients with a history of chlorhexidine sensitivity.

Povidone Iodine 10% (*Videne®* or *Betadine®*) should no longer be used prior to performing lumbar puncture. Use appropriate chlorhexidine product listed above instead.

The routine use of antimicrobial or antiseptic ointments around CVC insertion sites at the time of insertion or during dressing changes is not recommended


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Table 2. Guide to CVAD choice and the duration of usage

Type of Line	Type of access	Location	Length of usage
PERIPHERALLY INSERTED CENTRAL CATHETER PICC	<ul style="list-style-type: none"> Short-term venous access devices Inserted under local anaesthetic 	<ul style="list-style-type: none"> Brachial, cephalic, median-cubital or scalp vein placement Single or multiple lumens 	0 days to 6 weeks
MIDLINE	<ul style="list-style-type: none"> Short-term venous access devices Inserted under local anaesthetic 	<ul style="list-style-type: none"> Brachial, cephalic, median-cubital or scalp vein placement Single or multiple lumens 	0 days to 6 weeks
<p><i>Midlines can be used for antibiotic therapy, and fluids, blood transfusions, although not for concentrated TPN intended to use for centrally located catheters. So midline catheters should not be used for any solution containing greater than 10 percent dextrose or 5 percent protein, or any vesicant or caustic solution.</i></p>			
Central Venous Catheter	<ul style="list-style-type: none"> Short term central device inserted under general anaesthetic 	<ul style="list-style-type: none"> Single or multiple lumens Right or left internal jugular usually preferred Sutured in place 	7-10 days
TUNNELLED HICKMAN OR BROVIAC	<ul style="list-style-type: none"> Known to the children in OLCHC as "Freddy" 	<ul style="list-style-type: none"> Infraclavicular placement Single or multiple lumens Dissolvable sutures are used. Dacron cuff. Can be felt under the skin. Inform medical staff if the Dacron cuff is visible, as this is an indication that the catheter has moved. 	indefinite
IMPLANTED VENOUS ACCESS PORT (IMPLANTOFIX)	<ul style="list-style-type: none"> Totally implanted venous access device Inserted under general anaesthetic Accessed through the skin using a non-coring needle 	<ul style="list-style-type: none"> Intradermal Dome-shaped Incision scar often seen across, above, or below the dome Palpable 	indefinite
Umbilical Venous Catheter	<ul style="list-style-type: none"> Used in neonatal units 	<ul style="list-style-type: none"> inserted via the umbilical vein in the umbilical cord, with the tip of the catheter positioned at the junction of the inferior vena cava (IVC) with the right atrium. It is above the diaphragm and beyond the liver at T9-T10 	3-7 days
Non tunnelled Permcath/Vascath	<ul style="list-style-type: none"> Used predominately for Haemofiltration or plasmapheresis 	<ul style="list-style-type: none"> Permcath are non-tunnelled long term lines used for haemodialysis or plasmapheresis. Vascaths are temporary non tunnelled lines used for maximum of three weeks for haemodialysis and haemofiltration or plasmapheresis 	Indefinite Max 3 weeks



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Table 3. Flush volumes for CVADS

Please ensure heparin dose is correct, flushing for discharge is a different dose to regular flushes*

Line type	Age	Blood discard volume	Suggested Flush volume for pre and post line use	Heparin dose
PICC/Midlines It is not possible to withdraw blood from a 1-2fr PICC	< 1 year	1ml	0.5ml- 1ml	10 units/ml
	1-3 years	2.5ml	1-2.5 mls	10 units/ml
	> 3 years	3.5ml	1-3mls	10 units/ml
Central Venous Catheters	< 1 year	1 ml	0.5-1ml	10 units/ml
	1-3 years	2.5ml	1-2.5mls	10 units/ml
	> 3 years	3-5ml	3-5 mls	10 units/ml
Hickman/Broviac	< 1 year	1 ml	As per surgeons	10 units/ml
	1-3 years	2 ml	As per surgeons	10 units/ml
	> 3 years	3-5 ml	As per surgeons	10 units/ml
Implantofix In some cases it may be requested that blood is withdrawn from an Implantofix.	< 1 year	N/A	1ml -2.5 mls	10 units/ml
	1-3 years	N/A	1ml- 2.5mls	10 units/ml but Use 100units/ml when on discharge for patients with CF*
	> 3 years	N/A	1ml-2.5mls	10 units/ml
Umbilical Venous Catheters	< 1 year	1ml	0.5-1ml	10 units/ml
	1-3 years	N/A	N/A	10 units/ml
	> 3 years	N/A	N/A	10 units/ml
Permcath/Vascath	< 1 year	1ml	0.5-1ml	See guideline
	1-3 years	N/A	N/A	See guideline
	> 3 years	N/A	N/A	See guideline

Antibiotic locks must be given using the Pharmacy guideline as per OLCHC formulary app

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3.0 Description

A Peripherally Inserted Central Catheter (PICC) is a single or double lumen catheter that is inserted via a peripheral vein into a central vein, the tip of which terminates centrally in the Superior Vena Cava (SVC) (Dougherty and Lister 2015)

4.0 Advantages of PICC

The PICC has many advantages over other central venous access devices:

- PICCs eliminate the risks associated with CVC placement such as pneumothorax, haemothorax and air embolism (Williams & Wilkins, 2014 (Corrigan et al, 2014) 31
- PICCs have been shown to be associated with a reduction in catheter sepsis.(Carlson 2000, Williams & Wilkins, 2014)
- PICCs help to preserve peripheral veins. (Williams & Wilkins, 2011)
- PICCs have been shown to reduce patient discomfort and provide a reliable form of access (Williams & Wilkins, 2011)

5.0 Device information


PICC's are available as single, double–lumen or triple lumen catheters, open ended or valved and may be made of silicone or polyurethane (Dougherty& Lister 2015). PICCs are between 15-60cms long with a diameter of 1-7Fr. Vygon and Cook catheters are used in Our Lady's Children's Hospital. It is essential that the size and gauge of the PICC line is suited to the rationale for line insertion. PICC tip position dictates medications suitable for infusion as does a consultant's decision.

6.0 Device Insertion

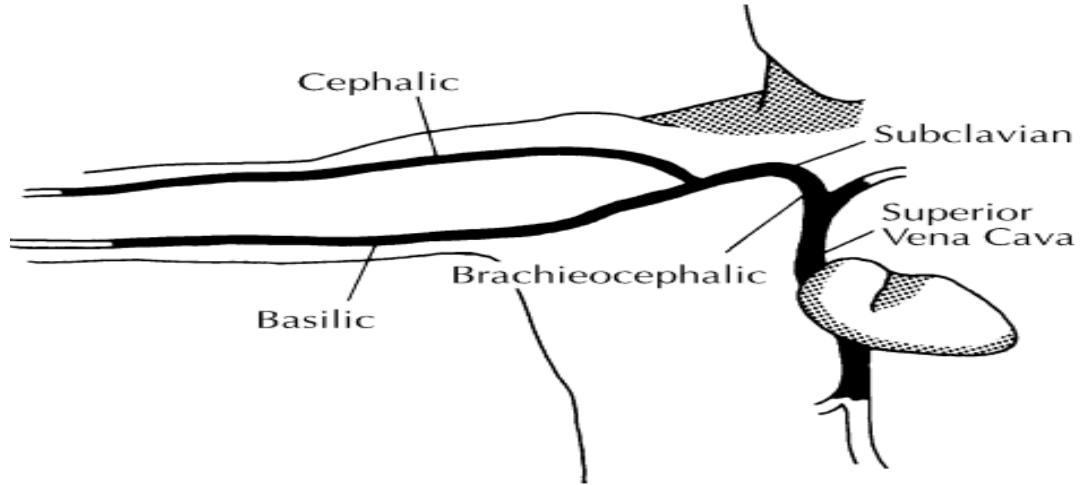
PICC's can be inserted by nurses or doctors who have received the appropriate education, training and competency.

Local anaesthetic topically using Ametop is considered to reduce the pain associated with initial venepuncture. Venous access is achieved by cannulation of a peripheral vein in the child's arm, e.g. basilic, cephalic or median cubital vein. In some cases sub cutaneous local anaesthetic may be considered.

The PICC is measured, and then slowly advanced until the tip lies in the distal SVC or some other preselected site along the peripheral vascular system (Goodwin & Carlson 1993). A chest X-ray must be carried out post insertion to confirm that the catheter is correctly positioned. (Dougherty and Lister 2015). The CXR is viewed by a doctor to confirm placement. The PICC should not be used until its position has been confirmed and this is documented in the child's notes.

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Appendix 1




7.0 Insertion sites for a PICC

PICCs must be secured in place to minimize movement while insitu (*Gabriele 2001*). PICCs can be adequately secured using steristrips or securement devices such as Statloc ® applied to the skin (*Gabriel 2000*). Sutures should not be used unless strongly indicated.

PICC'S can be inserted in any clinical area by appropriately trained staff once patient criteria is suitable.

8.0 Procedure




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Equipment


- Sterile gloves
- Drape
- Chlorhexidine 2% in 70% alcohol in infants > 2months corrected gestational age
- In infants < 2months use 0.5% Chlorhexidine in aqueous solution.
- Needle-free device
- Steri-strips
- Securement device see picture
- Peripherally inserted catheter (available from theatre or cath lab) type to be determined
- Introducer
- Tape measure all *included in the PICC pack 3-7, PICC 1 and 2 require a yellow cannula for size 1 or an introducer for size 2.*
- Transparent dressing - IV 3000 in the 3, 4, 5, 6 and a tegaderm on size 1 and 2.
- 10ml syringe 0.9% sodium chloride

INSERTION OF A PICC


ACTION	RATIONALE AND REFERENCE
Collect all appropriate equipment	To allow for full concentration on patient and procedure
Locate patient, check patient identification	To minimize the risk of error and to ensure that the procedure is carried out on the correct child (<i>Dougherty and Lister 2015</i>)
Explain the procedure to the child and family, relative to the child's age and understanding <i>Consent for procedure with sedation/anaesthetic must be sought and documented</i>	To obtain patient co-operation and alleviate anxieties. Ensure child/parents understand the procedure (<i>Trigg and Mohammed, 2010</i>)
Correct lighting and ventilation is required for the procedure.	To ensure operator and patient are comfortable and that adequate light is available to illuminate the procedure (<i>Dougherty and Lister 2015</i>).
Ensure the patient is in a comfortable position and that his/her privacy is maintained.	
Establish whether patient has allergy to skin preparation solution and adhesive material.	To prevent skin irritation (<i>Dougherty and Lister 2015</i>)
Decontaminate hands.	To prevent cross-infection (<i>OLCHC, 2010b</i>)
Select and assemble appropriate equipment prior to procedure	To prevent undue delays during procedure.
All equipment used for insertion PICC must be	To ensure equipment is fit for use. If the product's

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<p>inspected for product integrity before, during and after use to ensure sterility and fitness for use</p> <p>Assess venous access and choose appropriate vein</p> <p>Apply local anaesthetic cream if appropriate to chosen venepuncture site and leave for allotted time</p> <p>Position child in a supine position with the arm at 45^o, with ability to move arm to a 90^o angle.</p> <p>Measure using tape measure from the selected venepuncture site to the middle of the clavicle, and then measure from the clavicle across to the second /third sternal notch. This will give catheter measurement.</p> <p>For insertion on the ward for Vygon 1 + 2 ANTT level 3</p> <ol style="list-style-type: none"> 1. Position the tourniquet on high upper arm ready for use 2. Decontaminate hands 3. Wear mask and sterile gown 4. Apply sterile gloves 2 pairs 5. Using 10 ml syringe attach 2-3 mls NACL and flush line 6. Apply a sterile fenestrated drape under the infants arm 7. Nurse helper will hand you the infant arm and it will be wrapped in sterile gauze and secured with steristrips 8. Lay wrapped arm on sterile field ready for site disinfection 	<p>integrity is compromised, it should not be used. (INS 2001)</p> <p>To optimize best site for appropriate treatment. The selection of the vein may be a deciding factor in the success of and preservation of, veins for subsequent treatment.</p> <p>To minimize pain of insertion. (<i>Dougherty and Lister 2015</i>)</p> <p>To aid insertion of introducer and then advancement of catheter. (<i>Dougherty and Lister 2015</i>)</p> <p>To enable selection of the most suitable catheter length and to establish how far to advance the catheter in order for its tip to be located in the correct position. (<i>Dougherty and Lister 2015</i>)</p> <p>To minimize risk of infection</p> <p>To prevent cross-infection and protect the healthcare worker from blood spillage (INS 2001, OLCHC 2010a)</p> <p>This ensures flushed PICC line is ready for insertion</p> <p>To provide a sterile field. (<i>Dougherty and Lister 2015</i>)</p> <p>To ensure hand you handle is sterile during the procedure</p> <p>This rapidly reduces microbial counts on the skin (<i>INS 2001, SARI 2014, OLCHC 2011</i>)</p> <p>This allows next contact with the field with sterile gloves</p>
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<p>9. Disinfect the chosen site with Chlorohexidine solution as per age</p> <p>10. Remove first set of sterile gloves</p> <p>11. Nurse helper to tighten the tourniquet under the sterile field</p> <p>12. Cannulate using a 24 gauge yellow cannula for a 1fr or a peelable introducer for a 2fr.</p> <p>13. Remove the stylet and place gauze underneath the cannula.</p> <p>14. Pass the PICC through the introducer / cannula slowly, advance to the chosen length.</p> <p>15. Turn infants head towards the insertion site.</p> <p>16. Pull off the yellow cannula or peel the peelable introducer.</p> <p>17. Clean the yellow cannula and anchor at the end of the PICC not the insertion site with steristrips.</p> <p>18. When bleeding stops anchor PICC at insertion site with steristrips.</p> <p>19. Flush PICC with 1-2 mls saline in a 10mls syringe</p> <p>20. Clamp PICC</p> <p>21. Curl the external tubing around the arm to prevent kinking and secure with steristrips and cover with Tegaderm. Do not apply Tegaderm or steristrips around the arm.</p> <p>22. X-ray to check the PICC position prior to use</p> <p>23. Dispose of all waste and sharps appropriately</p>	<p>To encourage venous distension by obstructing venous return (<i>Dougherty and Lister 2015</i>)</p> <p>To minimise blood spillage</p> <p>To encourage PICC advancement through the SVC To prevent the catheter entering the jugular vein and to ensure correct advancement of the catheter downwards. (<i>Dougherty and Lister 2015</i>)</p> <p>This rapidly reduces microbial counts on the skin (<i>INS 2001, SARI 2014, OLCHC 2011</i>)</p> <p>See picture 1 page 17</p> <p>Applying steristrips or tegaderm circumferentially may restrict blood supply to the arm/hand/fingers.</p> <p>To ensure protection of the site. To prevent the tubing pressing into the child's skin. (<i>Dougherty and Lister 2015</i>)</p> <p>To check patency of device and ensure continued patency. (<i>Dougherty and Lister 2015</i>)</p> <p>To maintain accurate patient records. (<i>NHO, 2009,</i></p>
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<p>24. Document in HCR that the PICC is suitable for use once reviewed by medical staff.</p> <p>For insertion on the ward for COOK 3, 4, 5fr.</p> <p>25. Position the tourniquet on high upper arm ready for use</p> <p>26. Decontaminate hands</p> <p>27. Wear mask and sterile gown</p> <p>28. Put on sterile gloves two pairs</p> <p>29. Using 10 ml syringe attach 2-3 mls NACL and flush line</p> <p>30. Cut PICC to desired length and insert the guidewire into the PICC and clamp it.</p> <p>31. Disinfect the chosen site with Chlorohexidine solution as per age</p> <p>32. Apply sterile drape</p> <p>33. Remove the second set of gloves</p> <p>34. Nurse helper to tighten the tourniquet under the sterile field</p> <p>35. Cannulate with a 22 gauge blue cannula</p> <p>36. Place sterile gauze under cannula and remove stylet.</p> <p>37. Insert floppy wire through the cannula leaving about 6-10cms externally.</p> <p>38. Never force the floppy wire</p> <p>39. Remove cannula along the wire length ensuring the wire does not advance internally.</p> <p>40. With a blade nick skin over floppy wire to required depth</p>	<p><i>NMBI 2015)</i> Waste Policy OLCHC 2015</p> <p>To encourage venous distension by obstructing venous return (<i>Dougherty and Lister 2015</i>)</p> <p>To minimize risk of infection</p> <p>To prevent cross-infection and protect the healthcare worker from blood spillage (INS 2001, OLCHC 2010a)</p> <p>This ensures flushed PICC line is ready for insertion</p> <p>T his rapidly reduces microbial counts on the skin (<i>INS 2001, SARI 2014, OLCHC 2011</i>)</p> <p>To provide a sterile field. (<i>Dougherty and Lister 2015</i>) This allows next contact with the field with sterile gloves To encourage venous distension by obstructing venous return (<i>Dougherty and Lister 2015</i>)</p> <p>To minimise blood spillage</p> <p>The wire should move easily through the vein</p> <p>This will allow the introducer access to the vein</p>
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<p>41. Thread introducer on to floppy wire end and insert the introducer along the wire in a twisting motion under the skin maintaining the wire externally, to prevent loss of wire internally</p> <p>42. Remove wire through the introducer and announce 'wire has been removed' to helper</p> <p>43. Place gauze underneath</p> <p>44. Remove internal introducer by unscrewing it and quickly inserting the wired PICC to avoid excess blood spillage.</p> <p>45. Turn child's head towards insertion site to encourage PICC entry into the SVC.</p> <p>46. Hold the PICC and gently withdraw the introducer and peel reinserting PICC if it moves.</p> <p>47. Apply gauze to cleanse from blood spillage and clean and dry skin around the site.</p> <p>48. Unclamp the PICC and remove the wire and reclamp and announce 'wire removed' to helper.</p> <p>49. Attach 5-10mls saline in a 10ml syringe with needlefree device in situ.</p> <p>50. Flush the PICC and announce to helper the 'PICC is flushing well'</p> <p>51. Draw back blood and announce 'good blood return' and then reflush.</p> <p>52. Secure PICC with securement device and cover with IV 3000.</p> <p>53. Await check x-ray and documentation by medical staff that PICC is suitable for use.</p>	<p>To minimise blood spillage</p> <p>To prevent the catheter entering the jugular vein and to ensure correct advancement of the catheter downwards. <i>(Dougherty and Lister 2015)</i></p> <p>To minimise blood spillage</p> <p>To check patency of device and ensure continued patency. <i>(Dougherty and Lister 2015)</i></p> <p>To ensure patency of device.</p> <p>To anchor the catheter securely to the skin, preventing cannula movement, mechanical irritation or extrinsic contamination of the wound. <i>(Maki 1991, INS 2001, OLCHC 2010b)</i>.</p> <p>To check patency of device and ensure continued patency. <i>(Dougherty and Lister 2015)</i></p> <p>To ensure patency of device.</p>
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9.0 Checking patency of the PICC

- Rupture of catheters under high pressure is a potential serious problem (*Trotter and Carey 1998*).
- **ALWAYS USE 10ML SYRINGE WHEN CHECKING CATHETER PATENCY**
- Aspirating for blood return to check patency may not be possible in small gauge PICC lines used in children.
- **Do not apply excessive force as this may damage the catheter**
- Ensure that the catheter flushes easily and that blood can be aspirated if the internal diameter allows for this (*Levy et al 2010*). This applies to catheters size 3 and above only.
- Needle free device to be changed following 150 accesses or a period of 1 week – whichever comes first.

10.0 Instilling Urokinase into a CVAD

Action	Rationale & Reference
1. Open water for injection and wipe top of Urokinase vial with a alcohol wipes	To ensure a secure fit.
2. Add 2ml of water to the Urokinase vial	To check for patency. This ensures removal of any saline or heparin sodium, but may result in excessive blood loss in small infants and critically ill children. (<i>Cella & Watson 1989</i>)
3. When dissolved draw up 1ml of Urokinase (5,000 units) in 2ml syringe if < 3years, and 2mls if > 3years	
4. Expel all air bubbles, remove green needle, and attach non-injectable bung.	To prepare for administration. (<i>Dougherty and Lister 2015</i>)
5. Place on tray with Chlorhexidine and alcohol wipes.	Potential risk of thrombus release into general circulation
6. Insert syringe, containing Urokinase into Needle free firmly, and rotate to the right for a secure fit.	
7. Open clamp and slowly and gently instil 1ml of Urokinase	
Note: Do not apply force to instil the Urokinase. Use gentle push pause action. If unsuccessful contact medical personnel	To maintain accurate patient records. (<i>NHO, 2009, NMBI 2015</i>)
8. Document all interventions in the healthcare record	

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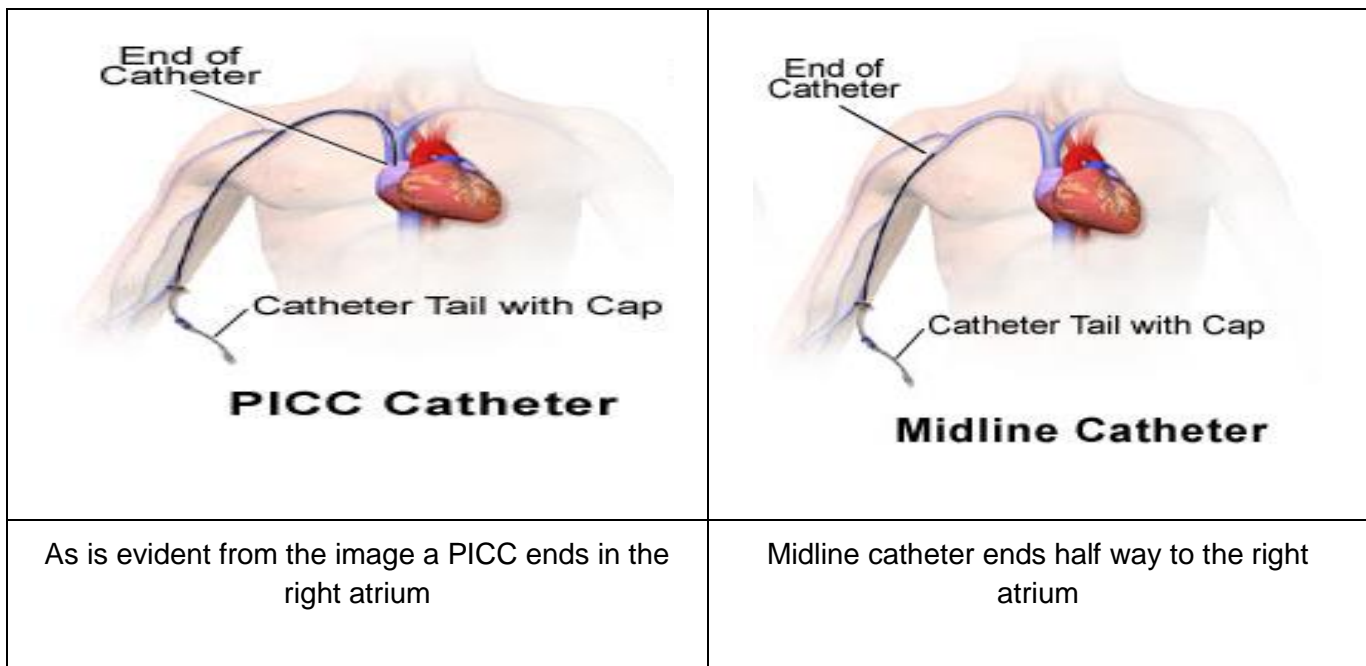
11.0 Removal of PICC line

Action	Rationale & Reference
Specifically trained nursing staff may remove PICC lines taking the following into account: A decision to remove the catheter must be made in consultation with the entire medical staff involved in the child's care following completion of therapy, following line infection or if line appears occluded.	
Prepare the patient for line removal. Explain the procedure to the patient if appropriate and the parent	To obtain patient co-operation and alleviate anxieties. Ensure child/parents understand the procedure (<i>Trigg and Mohammed, 2010</i>).
Ensure the child and their limbs are warm prior to line removal. Gather required equipment to the bedside	To prevent undue delays during procedure
Decontaminate hands	To prevent cross-infection (<i>OLCHC, 2010b</i>)
If the assistance of another staff member is required ensure procedure is carried out when they are available	To allow for full concentration on patient and procedure
Remove the dressing at the exit site. Remove the securement device. Cleanse the picc site with Chlorhexidine and Alcohol solution.	To prevent cross-infection (<i>OLCHC, 2010b</i>)
Grasp the picc line between thumb and forefinger and pull the line gently until the full line is removed. Do not force removal as the vein could be in spasm, wait for 2 to 3 mins until the limb is warm and retry line removal. Examine the line for integrity	To ensure the entire line has been removed and not left internally.
Place pressure on the exit site with a gauze swab until bleeding if any has ceased. Apply a dressing if required Send line tip to the laboratory if required	To cease bleeding To cover the site and prevent contamination To check for any infection
Dispose of all items appropriately Document line removal in the healthcare record	Waste Policy, OLCHC standard precautions 2011 To maintain accurate patient records. (<i>NHO, 2009, NMBI 2015</i>)

12.0 Introduction to Midlines


Midline catheters are longer than a peripheral intravenous catheter, but shorter than Peripherally Inserted Central Catheter line or central line. Midline catheters describes central venous catheters which are inserted via peripheral vein into a vessel distal to the shoulder. The catheter used is a central line (Vygon or Cook) inserted peripherally. The catheter tip of the line should lie distally to a shoulder, ideally in axilla. They are usually used for therapies from 1- 4 weeks. Midline catheters are associated with less risk of phlebitis than short peripheral IVs (Mermel, Parenteau and Tow 1995).

Midlines are associated with a rate of bloodstream infection between 0.3 and 0.8 per 1,000 catheter days (Mermel, Parenteau and Tow 1995) (Tokars, et al. 1999), a rate that is less than that reported for central venous lines and even PICC lines (Safdar and Maki 2005). **Unlike central and PICC lines, the tip of a midline catheter is meant to end in a peripheral vein and their placement does not need to be verified by X-ray.** Thus midlines avoid many of the cardiac problems that can occur with lines that terminate centrally such as heart arrhythmias (Bivins and Callahan 2000).




A midline catheter is treated as a PICC line with some differences.

- *See detail regarding dressing a PICC line page 5 & 6*
- *IV concentrations of Dextrose > 10% not to be infused*
- *IV concentrations of Protein > 5% not to be infused*
- *Some vesicant medications not to be considered*

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Picture 1. Curl of PICC under transparent dressing to prevent kinking

