



GUIDELINE

**Central Venous Access Device: Percutaneously Inserted
Central Catheter (PICC)/ Long-line**

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH, NETS WA

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this [disclaimer](#)

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Aim

The aim of this guideline is to outline the insertion and management of Percutaneously Inserted Central Catheter (PICC) / Long-line in newborn infants. This is a supplementary guideline to the main [Central Venous Access Device Bundle](#).

Risk

There are risks associated with central venous access if this guideline is not followed which includes thrombosis, skin infection at the site of insertion, trauma, distorted anatomy and coagulopathy.

Complications

Complications that can arise from PICCs:

- Thrombosis (3%),
- Leakage (2%),
- Infection (1.6%),
- Displacement/migration (1%),
- Pleural/ pericardial effusions (0.6%) and
- Breakage (0.6%).

Prior to Procedure

The clinician performing the procedure must have appropriate training or supervision during the procedure.

- Position the infant with identified area exposed and easily accessible. It is often useful to swaddle an active neonate allowing for more stability and comfort during the procedure
- Ensure adequate thermoregulation.
- Refer to the [CVAD bundle](#) for pain and sedation management
- For Anatomical landmarks and measurements, refer to Appendix 1

Choosing the PICC catheters:

The preferred choice of catheter will depend both on infant size and requirements and PICC factors. The following PICC are currently available in Neonatal unit:

- Vygon Epicutaneo-Cava
- Vygon Twinflo
- Vygon Premicath

Catheter	Vygon Epicutaneo-Cava	Vygon Nutriline Twinflo	Vygon Premicath	Vygon Premicath
1. Description	2 Fr (24G) 30cm length single lumen	2Fr (24G) 30 cm double lumen	1 Fr (28G) 20cm single lumen	1Fr (28G) 30cm single lumen
2. Introducer	19G winged needle 20G Microflash peelable cannula 20G (pink) cannula	20G Microflash peelable cannula 20G (pink) cannula	24G (yellow) cannula	24G (yellow) cannula
3. Maximum Pressure as per manufacturer	14.5 psi (760mmHg)	21.8 psi (1140mmHg)	21.8 psi (1140mmHg)	21.8 psi (1140mmHg)
4. Maximum clinical delivery pressure for neonates	200-300 mmHg	200-300 mmHg	200-300 mmHg	200-300 mmHg
5. Maximum flow rate as per manufacturer	4.5ml/min	1.45ml/min (x2)	0.7ml/min	0.7ml/min
6. Safe clinical delivery flow rate	20-30 ml/hr	7-10 for each lumen ml/hr	7-10 ml/hr	7-10 ml/hr
7. Stylet	No	No	Code 1261.201- No Code 1261.205- Yes	Yes
8. Suitable infants	Preferred PICC for all infants > 1000g.	Preferred PICC for all infants > 1000g. For infants requiring multiple infusions.	Infants <1000g or >1000 g infants using an arm vein due to shorter length of line	Infants >1000g infants when a 2Fr catheter is unable to be inserted
9. Useful notes	The introducer needs to be removed after insertion by carefully sliding the needle over the catheter. See below for details		Has a stylet which needs to be removed after insertion. It is occasionally not possible to aspirate blood from this line, even when correctly sited.	Has a stylet which needs to be removed after insertion. Use the longer catheter if you choose It is occasionally not possible to aspirate blood from this line, even when correctly sited.

Equipment

Common equipment

- Surgical gown x 1
- Sterile pair of gloves x 2
- Mask x1
- Face Shield (as required) x1
- Antiseptic solution:
 - >27 weeks gestation: 1% chlorhexidine solution
 - ≤27 weeks gestation: Povidone-iodine solution
- PICC placement kit (Appendix 2)
- Sterile 0.9% Sodium chloride ampoules x2
- Sterile absorbent towel x 1
- 3-way taps x 3
- Smartsite™ valves x2 (for each 3-way tap)
- Fluids
 - ≤27 weeks - Sodium Chloride 0.45% + 0.5 u/mL Heparin
 - >27 weeks - Sodium Chloride 0.9% + 0.5 u/mL Heparin
- Volumetric/syringe pump with pressure display monitoring and appropriate pressure giving set.

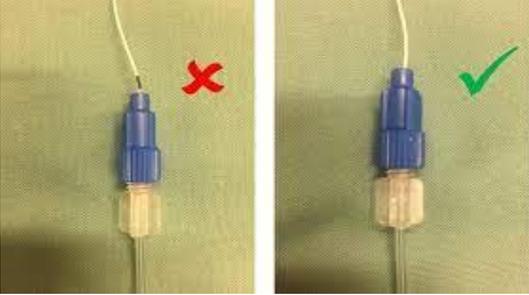
PICC / Long Line specific

- Appropriate size Long-line catheter x1
- 24G (Yellow) or 20G (Pink) cannula (if used as the introducer) x2
- Small sterile Mepilex™/Comfeel™ x1
- Large Tegaderm™ x2
- Sterile plastic drape X 2

***Note:** *Do not use a syringe less than 10ml. The smaller the syringe, the greater the pressure - which may rupture the line.*

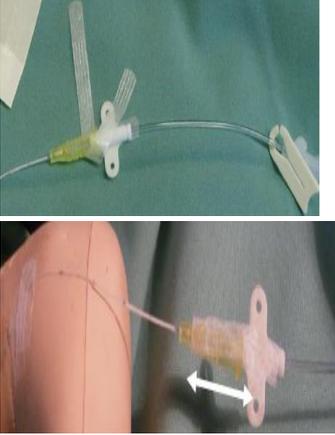
Steps	Pictures / Additional notes
chemical burns to the back due to antiseptic solution	
<p>6. Request the assistant (Donned with sterile gown and gloves) to hold the infant's limb proximally, using one hand</p> <p>Assistant to keep the other hand sterile</p>	
<p>7. Proceduralist then scrubs & cleans the distal part of the limb with anti-septic solution twice</p>	<p>Wait for the site of insertion to air-dry for at least 60 seconds.</p>
<p>8. Apply sterile gauze to cleaned distal part of limb and request assistant to hold the limb with the <i>other sterile hand</i></p>	 
<p>9. Proceduralist then scrubs & cleans the proximal part of the limb twice</p>	<p>Wait for the site of insertion to air-dry for at least 60 seconds</p>
<p>10. Assistant to remove the gauze and the proceduralist to insert the cleaned limb through the hole of the sterile plastic. Maintain sterility.</p> <p>Remove the first set of sterile gloves (without contaminating the second set of gloves) and discard.</p>	

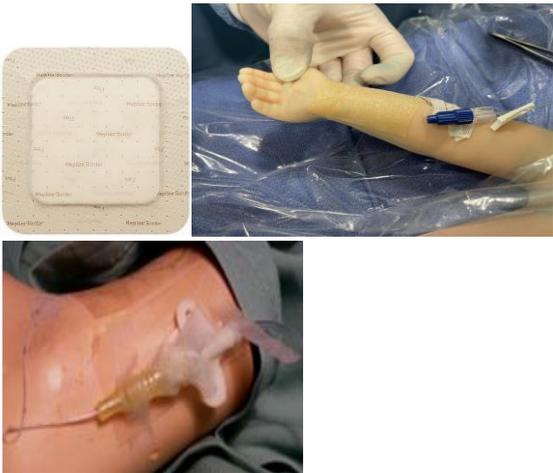
Cannulation and catheter insertion

Steps	Pictures / Additional notes
<p>Insert your chosen introducer (cannula/breakaway needle/MicroFlash®).</p> <p>When blood flashback occurs remove the needle and using a non-toothed forceps, insert and advance the catheter in 0.5-1cm increments through the cannula to the premeasured length.</p> <p>Flush the catheter with saline while threading if obstruction is realised</p>	 <p>24G breakaway needle The smallest split introducer for small veins</p> <p>24G I.V. cannula Basic non-peelable introducer</p> <p>20G split Microflash Fast detection of blood return</p> <p>Catheter with fixation system for the cannula</p> <p>20G cannula</p> <p>Copyright © 2021 VYGON</p> 
<p>Catheter advancement:</p> <p>When catheter is advanced, apply gentle pressure on the insertion site and simultaneously ease the introducer / cannula without removing the catheter.</p> <p>*The catheter must NOT be picked up by the gloved hands. Use an un-toothed pair of forceps to manoeuvre the catheter</p>	<p><u>Preferable:</u> Do NOT remove the cannula from the insertion site until feeding the catheter to the designated length is complete to avoid contamination.</p> 
<p>Removal of needle or cannula</p> <ul style="list-style-type: none"> After feeding the catheter to the measured length, peel or break-away the introducer (NOT possible for IV.cannulas) <p>*Apply continual pressure to insertion site if bleeding continues.</p> <ul style="list-style-type: none"> IV cannula can be removed if the line being used is Vygon Epicutaneo-Cava. <p>Loosen the blue compression hub from the clear plastic extension and slide out the catheter from the hub. Carefully</p>	 

Steps	Pictures / Additional notes
<p>slide off the introducer over the catheter and replace it into the hub.</p> <p>In all other circumstances, IV cannula will be left in situ under the sterile dressing</p>	<p><i>Make sure the black marker is fully out of sight and tighten the hub.</i></p> <p><i>Ensure the metal end lies mainly in the clear half of the connection when in place.</i></p> <p><i>The metal can puncture through the line if it migrates beyond the blue cap end resulting in removal of the line</i></p>
<p>Removal of guidewire:</p> <p>Check for guidewire presence in your chosen catheter type and remove the guidewire (if present)</p> <p>Pull the guide wire out slowly keeping straight path to the pull.</p>	<p>Ensure guidewire is removed intact</p> <p><i>It is recommended to remove guide wire before looping the catheter for dressing</i></p>

Securing the line and dressing:

Steps	Pictures / Additional notes
<p>Secure the catheter with a short piece of steristrip on the skin - about 0.5cm away from the insertion site</p> <p>Apply the 2nd small piece of steristrip below the 1st steristrip</p>	
<p>If a cannula is used as introducer, instead of a breakaway needle or Microflash[®], flush the hub of the yellow / pink cannula with a 18g needle attached to the 5mL syringe of normal saline.</p>	<p>This is to ensure removal of any remaining blood in the hub which is a potential risk of infection</p>
<p>Secure the yellow cannula onto the white winged connection of the catheter with two pieces of Steristrips[™] in cross over fashion.</p>	
<p>Coil excess catheter away from entry site without kinking the catheter with one steristrip[™]</p> <p>* <i>DO NOT</i> apply excessive steristrips[™]. This is a potential for catheter dislodgement when the old dressing is being removed.</p>	

Steps	Pictures / Additional notes
<p>Stick appropriately sized Comfeel™/ Mepilex™ on the infant's skin and secure the hub on it with steristrip™</p> <p>At KEMH also apply tegaderm at this stage</p>	
<p>If bleeding continues despite pressure for some time, place Cavilon® sponge onto the insertion site and surrounding steristrips and apply gentle pressure for 30 seconds. Remove when bleeding stops.</p>	
<p>Once the catheter and hub are secured, commence heparinised fluids without delay 0.5ml-1.0ml/hr, cover ALL the sterile area with a clear sterile plastic sheet by wrapping around the whole arm. (Note: This step is prior to affixing the Tegaderms at PCH)</p>	<p>This is in preparation for the x-ray to confirm the catheter tip position.</p> <p>This method makes the process convenient if the PICC position needs adjustment, based on the x-ray.</p> <p>At the same time sterile field is maintained, PICC is visible through the sterile clear plastic sheet and chances of catheter dislodgement minimised while taking the x-ray.</p>
<p>Request assistant or non-assisting other medical/nursing staff to organise x-ray.</p> <p>*Call for x-ray at the start of dressing</p>	<p>The proceduralist remains scrubbed to maintain asepsis whilst waiting for the x-ray result. <i>If required, PICC need to be adjusted after the x-ray and repeat x-ray performed to confirm the position.</i></p>

Steps	Pictures / Additional notes
<p>Once the final catheter position is confirmed by the x-ray, then secure the catheter sticking the large Tegaderms™.</p> <p>Use second Tegaderm™ if needed to cover the entire catheter, Mepilex™ and cannula.</p> <p>Ensure the dressing doesn't cover the arm circumferentially</p>	
<p>Secure the edges of the Tegaderms (from lifting off) by using the Fixomull™ tapes (as shown)</p>	
<p>Remove all equipment and drapes from the infant.</p>	<p>To avoid potential accidents with equipment.</p>
<p>Clear away all equipment and ensure that any needles or scalpel are safely disposed of into a sharps bin.</p>	<p>To safely dispose the sharps, post procedure</p>

Other Considerations

- Maximum 3 skin punctures to be made by given proceduralist at a time
- If unsuccessful allow for time out for infant and ask for help

- Most of the PICC line will bleed back if in an ideal position but occasionally a 28G line may not bleed back especially if in less-than-ideal position.

Unintentionally Short PICC (ie. Not in a large central vein):

In situations where there is no other venous access: They may be used for up to 24 hours and the site should be observed closely for extravasation. They should be entered on the problem list as a potential danger until removed from the patient. **Use for more than 24hours needs to be discussed with the consultant** on a case-by-case basis. They are a temporary venous access only.

Post procedure:

- The infant is left clean and dry, check linen under the infant and assess temperature.
- Confirmation of catheter tip position on X-ray: **Refer to [Central Line Imaging in Neonates](#)**
- A repeat x-ray is to be performed following catheter adjustment to confirm tip position. Adjustments to be documented in medical notes.
- Complete documentation on the CVAD Insertion and Maintenance MR422.01

PICC related thrombosis:

Refer to [Central Venous Access Device Bundle](#)

Dressing changes

Correct dressing management is critical to preventing infection. The dressing protects the insertion site and cannulated vessel from trauma and keeps the site clean and dry.

Changing longline dressing is a **sterile procedure** to minimise risk of infection. Dressing changes can be performed by those deemed competent only (medical staff, CN, NNT)

Indications for changing dressing

- Lifted and catheter is exposed.
- Evidence of excessive leakage around insertion site.
- Restriction of circulation and/or movement.

Equipment

- Hat and mask
- Sterile gloves
- Sterile gown
- Sterile towels
- Dressing pack
- Appropriate disinfectant
- Sterile scissors
- Sterile SteriStrips
- Transparent dressing (Tegaderm)

Considerations:

- Replace the catheter-site dressing under full sterile precautions if it becomes damp, loosened, or soiled or when inspection of the site is necessary. Otherwise, **DO NOT** replace dressings as the risk of dislodging the catheter and introducing infection outweighs the benefit of changing the dressing.
- **DO NOT** replace dressings if there is old blood with no active bleeding under the Tegaderm if blood is contained within the dressing, due to the risk of dislodgement.
- Each shift **inspect insertion site** for signs of infection/infiltration such as redness, swelling, tenderness, discharge or lifting of dressing to ensure early detection of complications. A swollen limb (or body part) near central line insertion may indicate:
 - Displacement or extravasation of central line.
 - Constriction due to tight dressing and/or tapes.
- **Check that transparent dressing is completely sealed**, free from drainage and non-restrictive. If no issues, leave dressing unchanged.

- **Dressing changes of PICC lines are NOT routine.** Changing insertion site dressing may introduce bacteria into catheter and may inadvertently alter the position of the catheter tip.
- **Evaluate appearance of catheter through insertion site.** Observe that catheter is not stretched or pulled taut at its insertion into hub and that tape is not on too tightly. Catheter is very fragile and may break if pulled.

Steps	Additional information
Clean trolley and bench surface (where sterile towel and gloves are placed), with surface disinfectant/wipe and allow to dry to prevent contamination of sterile equipment when pack and equipment opened.	
Collect equipment as above and arrange on side of trolley.	
Dons hat and mask to minimise risk of infection.	
Performs surgical hand wash up to the elbows for 3 minutes with 2% Chlorhexidine skin cleanser and water. Dry hands thoroughly with sterile towels.	
Dons sterile gown and gloves.	Assistant dons hat and mask and performs hand hygiene
Assistant opens dressing pack and Dr/CN/NNT takes it and opens it on the clean surface.	
Assistant to stabilize the longline hub and loosen the dressing toward the insertion site, avoiding tension on the catheter.	Stretching the dressing can help loosen it. Maintain sterile principles to minimize contamination of line and insertion site, damage to catheter or cause migration.
Person doing the dressing change to hold the limb with gauze and clean over old dressing.	Remove loosened old dressing carefully and discard. Maintain sterile field and avoid contamination.
Inspect the insertion site for signs of infection/infiltration i.e. redness, swelling, tenderness or discharge to facilitate identification of complications.	Remove line if any signs of infection/infiltration
Clean skin with appropriate disinfectant , beginning at the insertion site and clean upward away from	This is to reduce surface debris and cleanse tubing, thereby reducing the risk of infection under new dressing, and to

insertion site to catheter connection, taking special care not to pull on tubing. Allow solution to dry.	reduce skin flora present on catheter and around connection.
Gently coils the excess silastic tubing and tapes to skin with steri-strip, leaving insertion site visible.	
Place hub of longline on top of transparent dressing with small duoderm under for comfort.	Ensure no kinks in line.
Cover long line and hub with transparent dressing to ensure all exposed line is protected.	The transparent dressing allows easy visualization of the site and is changed only if it is no longer adherent.
Document dressing change and condition of insertion site in clinical notes and maintenance form to ensure accurate record taking and identification of change.	
Dispose of equipment into designated containers and perform hand hygiene.	Ensure adherence to protocols on sharps and rubbish disposal.

Removal of PICC:

PICCs are removed when they are no longer required, or sepsis is suspected. Removal of a PICC is a two-person standard aseptic technique; one staff member is required to aid in positioning the infant. PICC can be removed by nursing staff deemed competent in their removal.

Key points:

- If sepsis is suspected, the tip must be sent to the laboratory for culture.
- Prior to removing the catheter, check the documented length of catheter inserted.
- If there is any resistance, do not pull the line with force; ask a more experienced member of staff for assistance with the removal.
- Document the line removal on the observation chart and complete the removal section on the Neonatal CVAD Insertion Record MR422.
- Documentation should include any difficulties with catheter removal and state whether the catheter was visualised to be intact.
- Consider administration of sucrose prior to procedure.

Equipment:

- Dressing pack, sterile scissors/forceps
- Sterile specimen container (if tip required for culture)
- Adhesive remover
- Gauze

Procedure	Additional information
Use adhesive remover to lift edges of the dressing.	Stretch the dressing in an upward motion this allows for ease of removal. Take care not to pull or tear the catheter sheath
Remove the catheter using gentle sustained traction, holding the catheter close to the insertion site.	<p>Do not over stretch the catheter. Over stretching the catheter may cause it to rupture and rebound into the vein, causing a catheter embolus.</p> <p>If catheter rupture does occur and the catheter is NOT visible, place a finger over the vein without applying pressure.</p> <p>If the catheter is visible outside of the infant, grasp the catheter. Seek medical assistance and request an x-ray.</p>
If the catheter remains firmly attached surgical removal is required.	If sepsis is suspected cut the tip with sterile scissors and send for culture
Apply gentle pressure to the site with gauze, until bleeding stops to prevent a haematoma forming.	Do not apply a dressing over the site until bleeding has stopped
Document removal on Neonatal Intravascular Device Insertion Record MR422	

Related CAHS internal policies, procedures and guidelines

[Central Line Imaging in Neonates: Radiographic Views, and Acceptable Line Positions](#)

[Central Venous Access Device Bundle](#)

[Hand hygiene](#)

[Sepsis Neonatal](#)

[PCH Central Venous Access Devices \(CVAD\) and Midline Insertion and Management](#)

References and related external legislation, policies, and guidelines (if required)

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Useful resources

PICC placement:

<http://www.nejm.org/doi/full/10.1056/NEJMvcm1101914?rss=searchAndBrowse&>

This document can be made available in alternative formats on request.

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Healthy kids, healthy communities

Compassion

Excellence

Collaboration

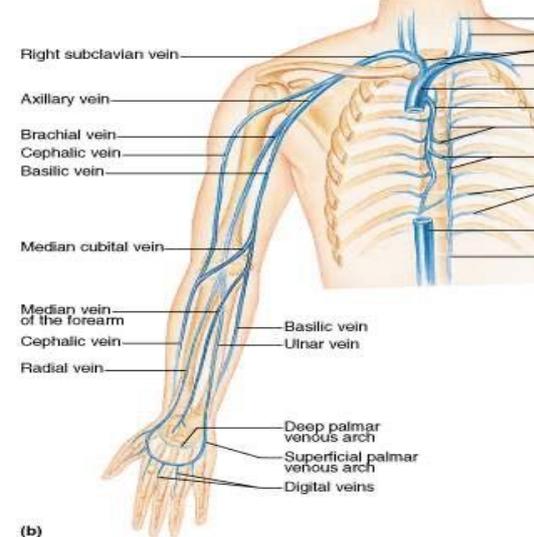
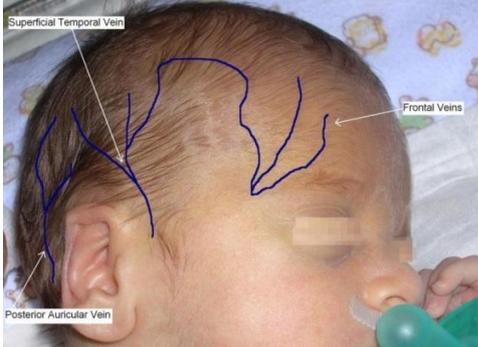
Accountability

Equity

Respect

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Appendix 1: Anatomical Landmarks and measurements

Suitable veins	Picture
<p><u>Long Saphenous vein</u> This is preferred location in neonates as lower limb PICCs have less rate of complications than upper limb. Right leg is preferred over left leg due to straighter course before it enters IVC</p> <p><u>Short Saphenous vein</u></p>	 <p>COPYRIGHT © 2021 BY ALEXANDER STREET, A PROQUEST COMPANY</p>
<p><u>Basilic vein</u> The right basilic vein is the vein of choice in the upper limbs due to its larger size and superficial location. Additionally, it has the straightest route to its destination and least no. of valves</p> <p><u>Median cubital vein</u> The median cubital vein is prominent in the antecubital fossa and courses directly to the basilic vein and onward into the SVC</p> <p><u>Cephalic vein</u> Smaller than basilic vein</p> <p><u>Brachial vein</u> It is smaller and runs deeper than the basilic vein</p>	 <p>(b) Copyright © 2001 Benjamin Cummings, an imprint of Addison Wesley</p>
<p><u>Scalp veins</u> ONLY if absolutely necessary and no other suitable veins are available Preferable to use posterior auricular vein due to straighter trajectory to neck</p>	 <p>Scalp vein catheterisation technique, Ethan Burgvall, Dec 2020</p>

Measurement

Arm Veins

From the insertion site along the arm to the shoulder joint, then to the sternal notch at the second intercostal space. This is the approximate location of the superior vena cava. The line should be at or below this position and at least 1 cm proximal to the right atrium.

Leg Veins

Measure from insertion site to the xiphisternum. Aim is for catheter to be above L4/5 and at least 1cm proximal to the right atrium.

Scalp Veins (Only if absolutely necessary)

From the insertion site to the clavicular head and then to the second intercostal space (T2) if using the right side OR from the clavicular head diagonally to the second intercostal space (T2) if using the left.

Appendix 2: PICC Placement Kit



- 1 x outer wrap
- 2 x drape towels (absorbent/impermeable)
- 2 x blue prep forceps
- 2 x measuring tapes (60cm)
- 2 x Tegaderm dressings (4cm x 4cm)
- 1 x 10ml luer lock syringe
- 1 x silicone neonatal tourniquet
- 4 x ball swabs
- 2 x hand towels
- 1 x peelable transparent drape with 'easy peel' 50cm x 50cm (opening 4cm)
- 1 x straight Reynolds scissors 9cm
- 1 x straight Iris forceps 10cm
- 1 x curved Iris forceps 10cm
- 5 x swabs, 4 ply (7.5cm x 7.5cm)
- 2 x gallipots 60ml
- 1 x tray 20cm x 15cm x 4cm
- 1 x pack of small steri-strips (6 x 38mm, x 6)

Note: PICC placement kit is preferred, in-line with the PCH CVAD guideline. However, suitable sterile reusable instrument kits may be used when PICC kits are not available.