Purpose

This policy and procedure outlines the educational requirements and the responsibilities of health care professionals within the Parenteral Therapy program who insert PICC lines with the intent of reducing complications for the patient.

Policy Statement

Health care professionals, in the Parenteral Therapy Program, who have completed the required educational program and have demonstrated competency may insert peripherally inserted central catheters independently.

A patient care order and proof of informed consent is required prior to PICC insertion (refer to Covenant Health policy #VII-B-50, Consent to Treatment/Procedures).

Policy Elements

Education:

1. Completion of a course in PICC instruction and ECG interpretation. The cognitive portion of this program may be completed through:

   a) Classroom attendance;
   b) Self-study modules;
   c) Interactive training techniques; or
   d) A combination of the above.

2. Annual test of ECG interpretation of competency must be completed.

3. Observation of five successful insertions; followed by 15 demonstrated successful insertions until proficiency is determined to be acceptable and a competent Parenteral Therapy RN who teaches PICC insertions has validated competency. The health care professional is responsible to identify if assistance or practice is needed to maintain competency.

4. In order to teach PICC insertions, a competent Parenteral Therapy RN must have a minimum of 50 documented successful insertions

Patient Assessment & Device Selection:

1. Prior to insertion of the ordered PICC, patients will be assessed by the Parenteral Therapy Registered Nurse (RN) to confirm that the ordered device is appropriate for the patient based on the patient's co-morbidities. The Parenteral Therapy RN will contact the most responsible health practitioner if concerns are noted or with recommendations for another type of central venous access device.
2. The vein will be assessed for health up to the axillary crease. Unhealthy veins will not be used.

3. A risk vs. benefit analysis will be completed if the PICC will occupy more than 50% of the vein diameter. The smallest gauge will be chosen that will accomplish the therapy. The risk benefit analysis will be documented.

4. Antiseptic/antimicrobial impregnated PICC products (eg. Chlorag+ard) may be used in all patients except:
   - patients with a known allergy to catheter components
   - patients with suspected allergy to catheter components
   - patients with multiple allergies. It is at the discretion of the nurse inserting the PICC to use a coated PICC product.

5. Any patient in whom an antiseptic/antimicrobial PICC has been placed who exhibits allergy symptoms at time of placement will have the PICC removed promptly and a non-impregnated PICC placed.

**Infection Prevention and Control:**

1. PICC catheters will be inserted using full barrier precautions to reduce the risk of infection: Use of a standardized checklist to ensure adherence to recommended practices for access site preparation, infection prevention, and safety precautions.

2. PICC placement procedure is stopped for breaches in sterile technique.

**Insertion and Confirmation of Placement:**

1. The use of ultrasound guidance increases success rates and decreases insertion-related complications. PICC catheters will be inserted using ultrasound guidance and at sites above the antecubital fossa.

2. Seldinger or modified Seldinger technique will be used to decrease vein trauma, decrease insertion complications and decrease the risk of arterial puncture and nerve injury.

3. The tip shall dwell within the superior vena cava near the junction of the right atrium. If ECG tip confirmation is used a chest x-ray or fluoroscopy is not required. If the device is not placed using ECG guidance, then the tip location MUST be confirmed by either chest radiograph or fluoroscopy.

4. Once the tip location has been confirmed, the Parenteral Therapy Clinician may release the PICC for use.

5. If while using ultrasound to identify the vein, an abnormality is found; or while using ECG guidance, an unusual rhythm is noticed; the Parenteral Therapy
Clinician will alert the most responsible health practitioner and/or medical team of the findings.

6. If the patient has a pacemaker or automatic defibrillator the PICCs shall be placed on the contra-lateral side of the body if possible and tip placement will be confirmed by X-ray. If the PICC must be placed on the pacemaker side, prior to insertion, the health care professional will discuss this option with the prescriber and document the discussion.

7. The right side will be used unless contra-indicated by physiology or condition.

8. Arm circumference will be measured 10 cm. above the antecubital fossa at the time of PICC insertion, and documented, so that this measurement may be compared if arm swelling catheter-related-thrombosis is suspected.

Audits

The Parenteral Therapy team shall conduct audits to assess patient outcomes and to identify trends and develop mitigation strategies as appropriate.

Outcomes are monitored and analyzed once a year. Criteria of analysis will include, but may not be limited to;
- post insertion complications
- number of days indwelling
- % successful
- % removed due to complications.

Information gathered from analysis shall be used to monitor trends and, as indicated, modify practice to improve patient outcomes.

Applicability

This policy and procedure applies to Covenant Health Misericordia Parenteral Therapy health care professionals.

Responsibility

It is the health care professionals’ responsibility to identify and communicate when they are no longer qualified to independently perform PICC skills.

NOTE: The health care professional is always constrained by their own level of expertise.

General Information

CONTRAINDICATIONS

1. Inadequate vein/ small vein.

2. Potential source of infection in the antecubital site or upper arm from a pre-existing skin infection or wound.

3. Injury or trauma to the antecubital site or upper arm.
4. Severe bleeding disorder - not an absolute contra-indication.

5. Non compliance by patient (eg. confusion that may result in accidental removal) - not an absolute contraindication.

6. Chronic kidney disease that may require dialysis in future. Contact nephrologist to discuss vascular access options.

**Procedure**

**SAFETY PRINCIPLES.**

1. PICC catheters will be inserted using ECG guidance except:
   - patients who do not have an identifiable P wave,
   - patients who have pacemakers or defibrillators,
   - patients who are unable to lie still (ECG tracings are unreadable), or
   - other cases at the discretion of the person placing the PICC.

2. An assistant must be present during PICC insertion to support the psychosocial and physical needs of the patient; and to ensure full barrier precautions have been maintained.

3. Procedural pain/discomfort will be alleviated with intradermal Lidocaine if no allergy. Anxiety will be controlled by obtaining an order for anxiolytic medication as required, and/or by distraction.

**Pre-Placement Steps**

1. Assessment of patient for appropriate venous access.
   a) Basilic Vein – first choice – larger more direct route to axillary vein.
   b) Cephalic – most complex insertion due to greater number of valves and smaller vein. Higher complication rate.
   c) Brachial vein – usually smaller and less desirable as it is close to the brachial artery and nerve bundle.

2. Assess for the type of PICC product required (eg. power Injectable, silicone) and number of lumens required. Choose fewest lumens and smallest size to accommodate anticipated therapy.

**EQUIPMENT**

Standardized supply cart or kit that contains all necessary components will be used for insertion

- Masks– inserter requires eye splash protection, all others in room must wear mask.
- hair cover for inserter and assistant
- catheter kit with introducer
• tourniquet
• tape measure
• powder free sterile gloves X2
• sterile gown
• pre-filled 10 ml normal saline for injection
• Injection cap – 1 per lumen
• 3cc syringe if using Lidocaine
• 18 gauge needle
• 24 gauge needle
• Chlorhexidine 2% with 70% alcohol to cover 10cm by 20 cm area
• Lidocaine 1% without epinephrine
• Transparent dressing (2) 10cm x 14cm
• hand scrub (chlorhexidine)
• Sodium citrate 4% /heparin lock solution 10 units/ml (5cc) (as required)
• Steri-strips
• sterile full body drape
• Sterile Ultrasound probe cover as required
• 2X2’s or 4X4’s dressings as needed
• StatSeal as needed
• SecurAcath or StatLock for securement
• PICC Insertion Tray
• SPD prepared insertion tray or disposable sterile tray and drape

PLACEMENT PROCEDURE

1. Verify physician order and signed consent. A procedural timeout must be performed with double identifier and right site surgery indicators prior to beginning procedure.

2. Ultrasound upper arm veins and assess for vein health along vein pathway as far as axillary crease. Choose vein. Measure vein diameter and depth at proposed insertion site. Mark skin with Sharpie or sterile marker at proposed insertion site. Evaluate that PICC takes up 50% or less of vein diameter. Obtain arm circumference.

3. If signs or symptoms of clot observed within vein (non-compressible vein and/or cloudy material inside lumen), contact attending physician for Venous Doppler studies prior to beginning procedure.

4. Clinician inserting PICC and assistant to wear hair cover and mask and observers wear mask. Patient may wear mask if tolerated.

5. Determine length of catheter by Lum chart (below) and/or measure vein course. Position the patient for insertion – supine with the arm extended at a 45-90° angle – head of bed may be slightly elevated. May use arm board for patient comfort.
a. Measure from the insertion site following the course of the vein to the head of the right clavicle. Measure down to the third intercostal space just to the right of the sternum. If intercostal spaces are not easily palpated, measure the distance from the sternal notch to the xiphoid process. One third of that distance should approximate location – right side measurement will be shorter.

b. PICC measurement chart
   i. Right PICC = 3 X Height divided by 10 cm
   ii. Left PICC = 3 X Height divided by 10, then + 4 cm
   iii. Assume insertion site 2.5 cm below antecubital fossa, if PICC inserted higher, measure 2.5 below antecubital fossa to insertion site and subtract this amount.

<table>
<thead>
<tr>
<th>Height inches</th>
<th>Height cm</th>
<th>Right arm (cm)</th>
<th>Left arm (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ft 8 in</td>
<td>143</td>
<td>42.5</td>
<td>46.5</td>
</tr>
<tr>
<td>4 ft 10 in</td>
<td>148</td>
<td>44</td>
<td>48</td>
</tr>
<tr>
<td>5 ft</td>
<td>153</td>
<td>45.5</td>
<td>49.5</td>
</tr>
<tr>
<td>5 ft 2 in</td>
<td>158</td>
<td>47</td>
<td>51</td>
</tr>
<tr>
<td>5 ft 4 in</td>
<td>163</td>
<td>48.5</td>
<td>52.5</td>
</tr>
<tr>
<td>5 ft 6 in</td>
<td>168</td>
<td>50</td>
<td>54</td>
</tr>
<tr>
<td>5 ft 8 in</td>
<td>173</td>
<td>51.5</td>
<td>55.5</td>
</tr>
<tr>
<td>5 ft 10 in</td>
<td>178</td>
<td>53</td>
<td>57</td>
</tr>
<tr>
<td>6 ft</td>
<td>183</td>
<td>54.5</td>
<td>58.5</td>
</tr>
<tr>
<td>6 ft 2 in</td>
<td>186</td>
<td>56</td>
<td>60</td>
</tr>
<tr>
<td>6 ft 4 in</td>
<td>193</td>
<td>57.5</td>
<td>61.5</td>
</tr>
</tbody>
</table>

6. If using, place Sherlock device on patient chest per manufacturer’s directions for use. If using ECG - Apply ECG leads. Evaluate ECG tracing for P waves and refine image as necessary. Place tourniquet under arm (ready to be tied when required).

**PREPARE STERILE FIELD:**

1. Inserter performs scrub using chlorhexidine surgical scrub solution for six minutes or as per product guidelines or surgical hand rub as per product guidelines. With assistants help dons sterile gown and gloves then dons outer pair of sterile gloves. Inserter prepares sterile tray and catheter according to manufacturer’s instructions.

**PREP PATIENT**

1. Inserter or assistant cleanses patients’ entire arm with chlorhexidine scrub or body cleanser for at least 30 seconds. Patient is draped with sterile cloth or paper
drapes. To expose only the amount of skin required to perform the procedure.

a) If allergic to chlorhexidine, use povidone iodine.

2. Prepare proposed insertion site with chlorhexidine 2% with alcohol 70% (if allergic use povidone iodine two minute scrub) for time recommended by manufacturer using friction. Allow to dry completely.

3. Inserter removes and discards outer pair of sterile gloves.

4. Ultrasound probe is covered with sterile probe cover, and placed on sterile field.

5. Assistant applies tourniquet.

6. Administer intradermal local anesthetic at proposed insertion site.

**ACCESSING VEIN**

1. Using ultrasound guidance, locate vein, and adjacent artery and nerve (to avoid puncturing adjacent structures).

2. Access vein with introducer needle using ultrasound guidance and modified Seldinger technique.

   a) Do not advance guidewire if resistance encountered.

4. Once guidewire is in place the introducer needle may be removed. More Lidocaine may be injected at this time if required for patient comfort.

5. Have assistant release tourniquet.

6. If required, use a scalpel to make a small dermatotomy (skin nick) beside wire and thread the vein dilator/introducer over guide wire and into vein.
   a) To avoid guidewire embolism, maintain control and position of the guidewire at all times.

<table>
<thead>
<tr>
<th>Bard Product: No ECG guidance</th>
<th>Bard Product: ECG guidance</th>
<th>Teleflex Vasonova: ECG guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove wire and dilator as one unit, leaving the introducer inside the vein. Advance PICC slowly and without resistance into introducer and vein.</td>
<td>Remove wire and attach dead end cap onto dilator/introducer end.</td>
<td>Remove wire and attach dead end cap onto dilator/introducer end.</td>
</tr>
<tr>
<td>Gently advance PICC along vein pathway using Sherlock image as a guide. Advance until PICC enters into the superior vena cava and until you hear the 3rd</td>
<td>Attach intravascular lead to Sherlock device and flush catheter to calibrate ECG tracing</td>
<td>Attach intravascular lead to Vasonova and flush catheter to calibrate ECG tracing</td>
</tr>
<tr>
<td>Action</td>
<td>Instructions</td>
<td></td>
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<tr>
<td>------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Remove introducer leaving PICC in place</td>
<td>Unscrew lock on vein dilator and remove it. Ensure the introducer remains in the vein. Unscrew lock on vein dilator and remove it. Ensure the introducer remains in the vein.</td>
<td></td>
</tr>
<tr>
<td>Remove Sherlock device</td>
<td>Advance the PICC through the introducer and into the vein.</td>
<td></td>
</tr>
<tr>
<td>Obtain Chest X-ray</td>
<td>Change Sherlock view to ECG guidance by flushing the catheter with NS, wait for calibration, then use the remote, and freeze the image to the right side of the screen. Observe monitor for green arrow, yellow arrow and orange circle. Take action as identified by product manual if orange circle is observed until yellow or green arrow is seen. Advance the catheter slowly through the vasculature.</td>
<td></td>
</tr>
<tr>
<td>Confirm with radiologist that PICC in distal SVC.</td>
<td>Monitor the ECG wave on the bottom left side of the screen for increasing P waves with no deflection as the PICC is advanced by 1 cm increments. As right atrium flow is observed, and P-waves increase, monitor for blue bulls-eye. Maintain blue bulls-eye for 10 seconds. Remove introducer. If available, print screen confirmation.</td>
<td></td>
</tr>
<tr>
<td>Remove the guidewire inside the PICC</td>
<td>Advance the PICC 1 cm at a time, flushing to calibrate and evaluating the P waves for increasing height and negative deflection. Remove ECG/Doppler lead from PICC.</td>
<td></td>
</tr>
<tr>
<td>Advance PICC until P waves are at their tallest with no negative deflection. This will only be known once P waves begin to get smaller or negative deflection is seen. Withdraw PICC to level of highest P wave. Remove introducer.</td>
<td>Flush to calibrate, freeze the image, and enter external length into the software program and print ECG tracing for documentation in the patient care record.</td>
<td></td>
</tr>
<tr>
<td>Remove intravascular lead/wire from PICC and remove the Sherlock device from the patient.</td>
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<td></td>
</tr>
</tbody>
</table>
SECUREMENT, DRESSING & LOCKING

1. Apply injection cap and flush every lumen of PICC with preservative free 0.9% normal saline for injection.

2. Attach SecurAcath device as per manufacturer’s direction to stabilize the PICC.

3. Ensure both sides of Nitinol wires are under skin;
   a) Ensure catheter did not kink with SecurAcath insertion. Aspirate and flush forward to ensure patency.
   b) Apply SecurAcath cap and ensure it is secure.
   c) Use with discretion if a minor allergy exists

   Exception: Health care professional inserting PICC may choose to use StatLock when severe allergy to nickel exists.

4. Apply dressing ensuring entire catheter length and catheter hub is under the dressing.

5. Stat-Seal of other product to control bleeding may be used as determined by the RN inserting the PICC.

6. Document procedure:
   a) side used; vessel accessed; tip position reported on X-ray with internal and external length or maximum P wave seen at ____ internal/external length.
   b) PICC product; number of lumens; French size; product Lot number
   c) amount of Lidocaine and lock solution used
   d) securement and dressing applied
   e) any difficulty with insertion;
   f) how patient tolerated the procedure
   g) any adverse or unusual occurrence during the procedure.

7. Complete SBAR tool.


Definitions

Health care professional means an individual who is a member of a regulated health discipline, as defined by the Health Disciplines Act [Alberta] or the Health Professions Act [Alberta], and who practices within scope and role.

Most responsible health practitioner means the health care professional who has responsibility and accountability for the specific treatment/procedure(s) provided to a patient and who is authorized by Covenant Health to perform the duties required to fulfill the delivery of such a treatment/procedure(s), within the scope of his/her practice.

Related Documents
References

11. Center for Disease Control: Guidelines for the prevention of intravascular catheter-related infections 2011
12. Association for professionals in infection control and epidemiology: guide to the elimination of catheter-related bloodstream infections. 2009
15. Preventing central line-associated bloodstream infections: a global challenge, a global perspective. The joint commission, Joint commission resources, joint commission international. 2012 the joint commission.
18. Infusion nurses society. Infusion nursing standards of practice. 2011 Volume 34, No. 1S Jan/Feb
22. Guidelines for Prevention of Intravascular – Device Related Infections from the Public, Health Service, US Department of Health and Human Services; Centre for Disease Control and Prevention, Atlanta, Georgia.
Chronological Revision Date(s)