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New Zealand instance



Peripherally inserted central catheter (PICC) insertion

Revised: June 14, 2019

Critical Notes!

Revised: July 25, 2018.

In the South Island - please refer to your DHB's existing procedures.

Follow your facilities policies and guidelines on pre-insertion blood testing and levels that are permitted for insertion of a PICC. Suggested blood tests are INR <1.6 and Platelets > 20-50.

Introduction

For a patient who needs long-term central venous (CV) infusion therapy or requires repeated venous access, a peripherally inserted central catheter (PICC) may be the best option. It provides safe, reliable access for administration of drugs and other infusions as well as for blood sampling. Infusions commonly administered through a PICC include total parenteral nutrition, chemotherapy, blood and blood products, antibiotics, intermittent inotropes, fluids, and analgesics. The decision to place a PICC is part of an interprofessional collaboration with the patient and caregiver and is based on the prescribed therapy and treatment plan.^{[1][2]}

PICCs are made of silicone or polyurethane and vary in diameter and length. They're available in single-, double-, and triple-lumen versions. You should use a PICC with the minimal number of lumens essential for managing the patient's care.^{[2][3]} The type and size of the PICC depends on the patient's size and anatomic measurements and the required therapy. Power injection-capable PICCs are also available for patients who require injection of contrast media for computed tomography scanning and other studies.

Most PICCs are manufactured with smooth, rounded tips to reduce trauma on the vein wall during insertion. To avoid the need to trim a PICC, the best option is to select a catheter length that's as close to the desired patient length measurement as possible. Groshong PICCs shouldn't be trimmed. Instead, subtract the desired patient length from the total length of the PICC, leave the length outside the insertion site, and secure it safely.

Most PICCs have a preloaded stylet wire inside the catheter to add stiffness to the soft catheter, easing its advancement through the vein. The stylet terminates 1 to 2 cm away from the catheter tip. If the catheter length does require trimming, you must withdraw and reposition the stylet 1 to 2 cm from the cut end. You should never cut the stylet; rather, remove it after insertion.

PICC devices are easier to insert than other CV access devices. You may use a single catheter for the entire course of therapy with greater convenience and reduced cost. If your state's nurse practice act permits, a nurse with proper training may insert a PICC. (The nurse may have to demonstrate competence every year.)^[4]

Veins you may consider for PICC insertion include the basilic, median cubital, cephalic, and brachial veins. When selecting a site, avoid areas that are painful on palpation; those compromised by bruising, infiltration, phlebitis, sclerosing, or cording; and forearm and upper arm veins that could be of use for vascular access in patients with stage 4 or 5 chronic kidney disease. Also avoid using the arm on the side of breast surgery with axillary node dissection, on the side with lymphedema, on the side where a pacemaker has been inserted, or on the side affected by stroke or radiation therapy.^{[2][5]} Use of an ultrasound device to guide insertion increases the rate of success and reduces the risk of insertion-related complications.^{[2][5][6][7][8]} (See [Bedside ultrasound for PICC insertion](#).) After insertion, advance the catheter until it reaches the cavoatrial junction.^{[2][5]} To reduce the risk of vascular catheter-associated infection, PICC insertion requires the use of maximal barrier precautions.^[3]

◆ **Hospital-acquired condition alert:** Keep in mind that the Centers for Medicare and Medicaid Services considers vascular catheter-associated infection a hospital-acquired condition *because it can be reasonably prevented using various best practices*. Make sure to follow evidence-based infection-prevention techniques (such as performing hand hygiene, using maximal barrier precautions, following sterile technique, and properly preparing the insertion site) during insertion *to reduce the risk of vascular catheter-associated infection*.^{[3][9][10][11][12][13][14][15][16]} ◆

You may insert a PICC using a modified Seldinger technique (the procedure discussed here) or a through-the-introducer technique.

BEDSIDE ULTRASOUND FOR PICC INSERTION

Although the use of bedside ultrasound requires special training, it helps provide safer, more efficient insertion of a peripherally inserted central catheter (PICC). Since the introduction of ultrasound, the placement of PICCs using visualization and palpation alone is rare. Advantages of using ultrasound include:

- ability to locate the exact position of veins that are neither visible nor palpable
- ability to detect possible anatomic variations or thrombosis in the vessel

- successful cannulation rate of more than 90% on the first attempt
- possibility of inserting a PICC in a location away from the antecubital fossa, which can limit or eliminate such complications as mechanical phlebitis
- reduction in complications related to traumatic placement.

■ Equipment

- PICC insertion kit
- PICC catheter
- Insertion checklist
- Antiseptic swabs (chlorhexidine-based preferred; tincture of iodine, povidone-iodine, or alcohol-based may also be used if a contraindication to chlorhexidine exists)
- Sterile and clean single-use disposable measuring tapes (2)
- 10 mL syringes prefilled with preservative-free normal saline solution
- Syringes and needles of appropriate size
- Sterile gauze pads
- Fluid-impermeable pads
- Sterile drapes
- Disposable skin marker
- Single-patient-use tourniquet
- Sterile marker
- Sterile labels
- Clean gloves
- Sterile gloves
- Sterile gown
- Mask
- Protective eyewear
- Head cover
- 1% lidocaine without EPINEPHrine
- Engineered stabilization device
- Sterile transparent semipermeable dressings
- Sterile 2" × 2" (5-cm × 5-cm) gauze pad
- Optional: bedside ultrasound equipment, sterile and clean disposable ultrasound probe covers, sterile ultrasound gel, locator system, chlorhexidine-impregnated sponge dressing, topical anesthetic cream, sterile needleless connectors, prefilled 10-mL syringe of heparin lock solution (10 units/mL), single-patient-use scissors or disposable-head surgical clippers, sterile tape, sterile surgical strips, skin barrier solution

Use an all-inclusive insertion kit or cart that contains all of the necessary components for maintaining sterile technique during catheter insertion *to reduce the risk of vascular catheter-associated infection.*^{[6][14][17]}

■ Preparation of Equipment

Inspect all IV equipment and supplies; if a product is expired, its integrity is compromised, or it's defective, remove it from patient use, label it as expired or defective, and report the expiration or defect as directed by your facility.^{[2][18]}

■ Implementation

- Verify the practitioner's order for PICC insertion. If necessary, before placing the PICC, collaborate with the practitioner about any relative contraindications to placement.^[2]
- Review the patient's allergy status *to prevent anaphylaxis.*^[2]
- Confirm that informed consent has been obtained and that the signed consent form is in the patient's medical record.^{[17][19][20][21][22]}
- Gather and prepare the necessary equipment and supplies.
- Conduct a preprocedure verification *to make sure that all relevant documentation, related information, and equipment are available and correctly identified to the patient's identifiers.*^[23]
- Verify that the laboratory and imaging studies have been completed as ordered and that the results are in the patient's medical record. Notify the practitioner of any unexpected results.

- Obtain the assistance of a second nurse or an appropriate assistant who has undergone proper training *to ensure that you maintain sterile technique during the procedure.*¹⁵
- Close the door to the room and put a sign on the door that states, "Sterile procedure in progress. Do not enter."²
- Perform hand hygiene.^{3 14 24 25 26 27 28 29 30}
- Confirm the patient's identity using at least two patient identifiers.³¹
- Provide privacy.^{32 33 34 35}
- Explain the procedure to the patient and family (if appropriate) according to their individual communication and learning needs *to increase their understanding, allay their fears, and enhance cooperation.*³⁶
- Provide the patient with additional information related to the PICC insertion procedure, including the benefits, management, and potential risks. Teach the patient and family about measures to prevent vascular catheter-associated infections, including the importance of hand hygiene.^{2 37} Encourage them to remind staff to perform hand hygiene and to follow infection prevention practices when providing care.¹⁴
- Use an insertion checklist *to help adhere to infection prevention and safety practices during insertion.*^{2 6 14 15 24} (See [Central venous access catheter insertion checklist.](#)) Have your assistant stop the procedure immediately if any breaks in sterile technique are observed.





















CENTRAL VENOUS ACCESS CATHETER INSERTION CHECKLIST

Central venous access catheter insertion checklist			
Patient name: _____	Date: ___/___/___		
Medical record number: _____	Patient location: _____		
Catheter inserted by: _____	Procedure assisted by: _____		
Catheter type: <input type="checkbox"/> Central venous catheter <input type="checkbox"/> Dialysis catheter <input type="checkbox"/> PICC <input type="checkbox"/> Pulmonary artery catheter			
Antimicrobial catheter: <input type="checkbox"/> Yes <input type="checkbox"/> No Catheter exchanged over a guidewire: <input type="checkbox"/> Yes <input type="checkbox"/> No			
Insertion site: Jugular <input type="checkbox"/> Right <input type="checkbox"/> Left		Upper arm <input type="checkbox"/> Right <input type="checkbox"/> Left	
Subclavian <input type="checkbox"/> Right <input type="checkbox"/> Left		Femoral <input type="checkbox"/> Right <input type="checkbox"/> Left	
Reason for insertion: <input type="checkbox"/> New indication <input type="checkbox"/> Elective <input type="checkbox"/> Emergent <input type="checkbox"/> Replace malfunctioning catheter			
<input type="checkbox"/> Other _____			
Procedure checklist			
Safety intervention	Yes	Yes (after reminder)	No
Performed a "time-out"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Confirmed patient's identity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verified the procedure to be performed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assessed and marked the insertion site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verified patient positioning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verified needed supplies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verified relevant laboratory test results	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Performed hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Prepared skin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used chlorhexidine (or tincture of iodine, povidone iodine, or alcohol if patient allergy to chlorhexidine)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Allowed antiseptic solution to dry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Instituted maximal barrier precautions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a large, full-body sterile drape	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wore cap, mask, and sterile gown and gloves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintained sterile field	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Applied chlorhexidine-impregnated sponge, if appropriate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Applied sterile occlusive dressing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transparent semipermeable dressing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gauze dressing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Obtained placement verification chest X-ray	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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- Raise the patient's bed to waist level when providing patient care *to prevent caregiver back strain.*³⁸
- Perform hand hygiene.^{3 14 24 25 26 27 28 29 30}
- Place the patient in a supine flat position, with the arm extended at a 90-degree angle away from the body. If the patient can't tolerate a flat position, raise the head of the bed for patient comfort.^{2 1}
- Assess the patient's upper extremities and chest for contraindications to PICC placement.^{2 39}
- If you're using ultrasound, disinfect the ultrasound probe with an antiseptic wipe and then place a disposable cover on it.²
- Perform hand hygiene.^{3 14 24 25 26 27 28 29 30}
- Put on clean gloves.
- Apply a liberal amount of ultrasound gel to the patient's arm and use the probe to locate the veins, arteries, and nerves surrounding the proposed insertion site.^{2 1}
- Without a tourniquet in place, assess veins for size, path, shape, and compressibility. Healthy veins should compress easily when you apply light, downward pressure with the probe. Determine the depth of the intended vein for venipuncture and measure its diameter.² Use this information to select a catheter with a catheter-to-vein ratio of 45% or less *to prevent thrombosis.*^{2 40 1}

- Mark the level of the expected insertion site with a single-use disposable skin marker on the outer aspect of the arm *to avoid leaving ink under the dressing and enable appropriate skin cleansing.*^[2]
- Remove the ultrasound gel from the patient's skin.
- Using a clean, single-use measuring tape, measure the upper-arm circumference of the selected extremity *to provide a baseline measurement.* Take this measurement 4" (10 cm) above the antecubital fossa.^{[2] [6] [39]}
- Measure the distance from the intended insertion site to the clavicular head on the right side and then down to the bottom of the third intercostal space on the right (desired terminal tip location) to determine insertion depth. Add length, as needed, to accommodate use of the stabilization device.^[2]
- Clean the intended insertion site with soap and water if it's visibly soiled.^{[2] [6] [15] [39]}
- Remove excess hair from the intended insertion site, if needed, using a single-patient-use scissors or disposable-head surgical clippers *to facilitate dressing application.*^{[2] [6] [15] [39]}
- If you're using a topical anesthetic cream:
 - Apply the anesthetic cream to the insertion site.
 - Cover the site with a sterile transparent semipermeable dressing.
 - Note the time of application on a label and then place the label on the dressing.
 - Wait the recommended period of time (per the manufacturer's directions), usually 15 to 60 minutes, *to allow the cream to work.*^[2]
 - While waiting, return the bed to the lowest position *to prevent falls and maintain patient safety,*^[38] and position the patient for comfort.
 - Remove and discard your gloves.
 - Perform hand hygiene.^{[3] [14] [24] [25] [26] [27]}
 - After the recommended application time, perform hand hygiene, put on gloves *to avoid touching the cream,* remove the dressing, wipe off the cream, evaluate the effectiveness of the anesthetic, and assess for adverse reactions to the anesthetic.^[39]
 - Remove and discard your gloves.
 - Perform hand hygiene.^{[3] [14] [24] [25] [26] [27]}
- Place a fluid-impermeable pad under the arm.^{[2] [39]}
- Put on a surgical head cover, protective eyewear, and a mask. Have the second person do the same.^{[3] [6] [15] [41] [42]}
- Perform hand hygiene.^{[3] [24] [25] [26] [27]}
- Disinfect your work area using a hospital-grade disinfectant, and then allow it to dry.^{[2] [39]}
- Prepare a sterile field using a sterile drape.
- Set up the PICC supplies on the sterile field.^[2]
- If you didn't use a topical anesthetic, prepare a lidocaine injection.
- Label all medications, medication containers, and other solutions on and off the sterile field using a sterile marker and labels.^{[43] [44]}
- Perform hand hygiene.^{[3] [24] [25] [26] [27]}
- Put on a sterile gown and two pairs of sterile gloves.^{[2] [39] [45] [46]}
- Follow the manufacturer's recommendations and guidelines for using the stylet wire and altering the device length if the device requires trimming. Don't use scissors to adjust the PICC length *because trimming with scissors causes rough, irregular surfaces.*^{[1] [2]}
- Prepare the catheter according to the manufacturer's recommendations; flush the device and extension set (if needed) with preservative-free normal saline solution.^{[2] [39]}
- Place the catheter on the sterile field.
- Place a sterile drape under the patient's arm. If you're using the external jugular insertion site, place the sterile drape under the patient's shoulder.^[2]
- Prepare the insertion site by scrubbing with chlorhexidine swabs using a back-and-forth motion for about 30 seconds. Allow the area to dry for at least 3 minutes. Don't touch the intended insertion site.^{[2] [3] [6] [39]} If a contraindication to chlorhexidine exists, prepare the site with another recommended antiseptic following the manufacturer's instructions. For povidone-iodine, apply it with swabs beginning at the intended insertion site and moving outward in a concentric circle. Allow the povidone-iodine to remain on the skin for at least 2 minutes *to dry completely.*^{[2] [6] [39]}
- Apply a single-patient-use tourniquet about 4" (10 cm) above the antecubital fossa. Make sure that an arterial pulse is easily palpable distal to the tourniquet.^[2]
- Remove the outer set of gloves.^[2]
- Place a full body drape over the patient from head to toe. Cover everything except the insertion site *to comply with maximal barrier precautions and, therefore, reduce the risk of vascular catheter-associated infection.*^{[2] [6] [39]} If the

- patient can't tolerate having the face covered, tent the drape and have the patient wear a mask or turn the head away from the insertion site.^[2] 
- If you're using ultrasound, place and secure a sterile probe cover on the ultrasound probe *to prevent cross-contamination between patients*. If you're using a locator system, follow the manufacturer's directions regarding its use.^[2]
 - Conduct a time-out immediately before starting the procedure *to determine that the correct patient, site, positioning, and procedure are identified and to confirm, as applicable, that relevant information and necessary equipment are available*.^[47]
 - If you're using ultrasound, apply sterile ultrasound gel to the probe and use it to locate the appropriate vein as well as the adjacent artery and nerve. Verify that the vein is nonpulsatile and compressible.^[2] 
 - If you didn't use a topical anesthetic cream, anesthetize the area with lidocaine *to provide for patient comfort during insertion*.^[2] 
 - While visualizing the vessel, insert the micro-introducer needle through the skin at a 45-degree angle. The micro-introducer needle will appear as an echogenic white dot on the ultrasound screen. Move the ultrasound probe and needle in the same direction, keeping the needle tip in view on the ultrasound screen as it approaches the vein. Align the path of the needle to enter the centermost superficial area of the vein wall. Observe for blood return and visualize the needle tip in the center of the vein on the ultrasound screen.^[2] 
 - Put the ultrasound probe down on the sterile field.
 - Reduce the angle of the micro-introducer needle and stabilize it.^[2] 
 - Insert the guide wire into the needle and carefully advance it at least 4" (10 cm) but not more than 6" (15 cm) into the vein.^[2] Stop advancing the guide wire if you meet resistance, and don't advance it past the axilla.^[2] 
 - Gently remove the needle, taking care not to dislodge or damage the guide wire.^[2] 
 - Secure the guidewire with your nondominant hand *to prevent migration in or out of the vein*.^[2] 
 - If necessary, using a safety scalpel, make a small skin nick at the insertion site *to facilitate the advancement of the peel-away dilator-introducer*.^[2]
 - Thread the peel-away dilator-introducer over the guide wire until you're sure the tip is well within the vein. After successful vein entry, you should see blood return.^[2] 
 - Carefully remove the guide wire and place it on the sterile field.^[2] 
 - Release the tourniquet, being careful not to break sterile technique.^[2] 
 - Confirm the preinsertion measurement for the desired catheter insertion depth.^[2] 
 - Carefully separate and remove the dilator from the peel-away introducer while holding the introducer still.^[2] 
 - *To minimize blood loss*, try applying finger pressure on the vein just beyond the distal end of the introducer sheath or place a finger over the opening of the introducer. 
 - If you're using a locator system, activate it now and follow the manufacturer's directions or use electrocardiogram (ECG)-guided technology *to detect the desired tip location*.^[2] 
 - (See [Understanding ECG-guided technology](#).) Advance the catheter through the introducer sheath at a slow, steady pace until it's in position at the premeasured length.^[2] 
 - If you aren't using tip-location technology, withdraw the stylet wire from the catheter lumen, using air emboli precautions.^[2]
 - Attach a prefilled syringe with preservative-free normal saline solution and aspirate for blood return; if present, flush the catheter *to determine patency*.^[2]
 - Grasp the tabs of the introducer sheath and flex them toward its distal end *to split the sheath*. Peel the introducer away from the catheter while pulling away from the insertion site. Take care to ensure that the catheter tip remains at its terminal tip location.^[2] 
 - If appropriate, connect a primed extension set to the catheter hub.^[2]
 - Attach a needleless connector to each lumen.^[2]
 - If available, apply a disinfectant-containing end cap to the end of the needleless connector.^[45]
 - Clean the site and secure the catheter with an engineered stabilization device, following the manufacturer's directions. An engineered stabilization device is recommended *because it reduces vascular access device motion, which increases the risk of unintentional catheter dislodgment and other complications that require premature catheter removal*. Whenever possible, sutures should be avoided *because they're associated with increased risk for needlestick injury and support the growth of biofilm, which increases the risk of catheter-related bloodstream infection*.^[49] If appropriate, first apply a skin barrier solution to the area to be covered by the stabilization device and dressing and allow it to dry. If you're using a chlorhexidine-impregnated sponge dressing, don't apply the skin barrier solution directly under the sponge *because the solution will block its action at the puncture site*.^[2] 
 - If necessary, apply a sterile 2" × 2" (5-cm × 5-cm) gauze pad directly over the site and a sterile transparent semipermeable dressing over the gauze pad. Leave this dressing in place for 24 hours.^[2] 
 - Lock the catheter with the prescribed locking solution or as directed by your facility.^[2] 
 - Return the bed to the lowest position *to prevent falls and maintain patient safety*.^[51]

- Discard used supplies in appropriate receptacles.⁴¹⁵²
- Remove and discard your gloves and other personal protective equipment.⁴¹⁴⁵⁴⁶
- Perform hand hygiene.³²⁴²⁵²⁶²⁸²⁹³⁰⁴¹⁵³
- Label the dressing with the date you performed the procedure or the date the dressing is next due to be changed, as directed by your facility.²⁵⁰
- If you didn't use a tip-locating device or ECG-guided technology, obtain a chest X-ray, as ordered, to verify proper placement before initiating an infusion.²⁶
- Perform hand hygiene.²⁴²⁵²⁶²⁸²⁹³⁰³¹⁴¹
- Put on gloves.⁴¹⁴⁵
- Clean and disinfect reusable equipment with a facility-approved disinfectant. Follow equipment manufacturer's instructions for use.
- Remove and discard your gloves.
- Perform hand hygiene.²⁴²⁵²⁶²⁸²⁹³⁰³¹⁴¹
- Document the procedure.⁵³⁵⁴⁵⁵⁵⁶⁵⁷

UNDERSTANDING ECG-GUIDED TECHNOLOGY

You can use electrocardiogram (ECG) technology to guide central venous access catheter insertion. This technique requires a metal guide wire or column of normal saline solution inside the catheter lumen. During insertion, the catheter itself functions as an intracavitary traveling electrode. As the catheter advances toward the sinoatrial node, P-wave changes occur on the ECG monitor tracing. You can identify the catheter tip location by the following ECG waveform changes:

- If there are no evident P-wave changes, the catheter tip isn't in an acceptable location.
- When the P waves appear at maximal height, the catheter tip is in the lower one-third of the superior vena cava, at the right atrial junction or cavoatrial junction, which is the desired catheter tip location.
- If a downward deflection appears on the leading edge of the P waves, the catheter tip is entering the right atrium.
- If biphasic P waves appear, the catheter tip is within the right atrium.
- An inverted P wave indicates that the catheter is approaching the right ventricle.

The practitioner can adjust the catheter position in real time during insertion, allowing for accurate tip placement. Therefore, a postinsertion chest X-ray isn't necessary to confirm catheter tip placement, which eliminates patient exposure to radiation and reduces cost.

ECG-guided technology is contraindicated in patients with an abnormal ECG rhythm in which P waves are absent or altered (such as those with a pacemaker, atrial fibrillation, or extreme tachycardia). Follow the manufacturers' directions for use in the appropriate patient populations.

■ Special Considerations

- After insertion, you may withdraw a PICC using a sterile dressing change procedure to ensure proper tip location; however, you should never advance a PICC.²
- Changes in the eye, such as pupil constriction with equal light reaction and upper eyelid drooping, are signs of nerve injury. PICCs and jugular-inserted catheters have been reported to produce eye changes, which are suggestive of inflammation of cervical sympathetic nerves (Horner's syndrome) caused by trauma from insertion technique and vein thrombosis.⁵⁸
- PICC therapy works best when introduced early in treatment; it shouldn't be considered as a last resort for patients with sclerotic or repeatedly punctured veins.
- Confirm venous blood return and catheter patency before initiating an infusion.
- Assess the catheter insertion site daily by inspection and palpation to discern tenderness through the transparent semipermeable dressing.³⁵⁰ Look at the catheter and cannula pathway, and check for bleeding, redness, drainage, and swelling. Although oozing is common for the first 24 hours after insertion, excessive bleeding after that period should be evaluated. Ask the patient about pain associated with therapy.
- For catheters that aren't in routine use, flush nonvalved catheters at least every 24 hours and valved catheters at least weekly.⁵⁹ Flush the catheter with preservative-free normal saline solution and lock it with heparin (10 units/mL) if applicable.⁶⁰

■ Patient Teaching

If the patient will be discharged with the PICC, teach the patient and caregiver infection prevention techniques, including hand hygiene and aseptic technique. Teach about the signs and symptoms of infection and when to notify the practitioner. Be sure to cover flushing and locking technique, dressing changes, activity limitations, and device protection during activities

of daily living. Use demonstration, return demonstration, and the teach-back method to confirm that you've provided information to the patient and caregiver in a way that they understand.

■ Complications

PICCs are associated with higher rates of deep vein thrombosis (DVT) than other CV access devices due to insertion into veins with a smaller diameter and greater movement in the upper extremity. Critical care patients and those with cancer are also at greater risk for DVT with PICCs when compared with other CV access devices. PICC insertion sites in the antecubital fossa have higher rates of DVT than mid-upper arm insertion sites.^[40] Infection and catheter breakage on removal are other possible complications.^[61] Critical care patients may also have a tendency for a higher rate of malposition on PICC insertion because of difficulty in patient positioning, use of mechanical ventilation, and different venous blood flow characteristics.^[52] Power injection can result in catheter tip malposition.^[2] Nerve injury can occur related to trauma from insertion or vein thrombosis.^[58] Air embolism, always a potential risk of venipuncture, is less likely with PICC therapy than with traditional CV access devices *because you insert the line below heart level.*

■ Documentation

Record the insertion site location; specific site preparation; local anesthetic (if used); infection prevention and safety precautions taken; the type, length, lot number, and size of the catheter inserted; external catheter length and length of the catheter inserted; date and time of insertion; the number of insertion attempts; arm circumference; device functionality; and insertion method, including visualization and guidance technology, confirmation of the anatomic location of the catheter tip, and the patient's tolerance of the procedure. Document patient and family (if applicable) teaching you provided, their understanding of that teaching, and any need for follow-up teaching.^[2]^[54]

This procedure has been reviewed by the Academy of Medical-Surgical Nurses.



■ Related Procedures

- [Peripherally inserted central catheter \(PICC\) insertion, neonatal](#)
- [Peripherally inserted central catheter \(PICC\) insertion, pediatric](#)

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[\(Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions\)](#)

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Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions

The following leveling system is from *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice* (2nd ed.) by Bernadette Mazurek Melnyk and Ellen Fineout-Overholt.

Level I: Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs)

Level II: Evidence obtained from well-designed RCTs

Level III: Evidence obtained from well-designed controlled trials without randomization

Level IV: Evidence from well-designed case-control and cohort studies

Level V: Evidence from systematic reviews of descriptive and qualitative studies

Level VI: Evidence from single descriptive or qualitative studies

Level VII: Evidence from the opinion of authorities and/or reports of expert committees

Modified from Guyatt, G. & Rennie, D. (2002). Users' Guides to the Medical Literature. Chicago, IL: American Medical Association; Harris, R.P., Helfand, M., Woolf, S.H., Lohr, K.N., Mulrow, C.D., Teutsch, S.M., et al. (2001). Current Methods of the U.S. Preventive Services Task Force: A Review of the Process. American Journal of Preventive Medicine, 20, 21-35.

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