



Clinical Practice Policy:	Peripherally Inserted Central Catheter (PICC) Insertion, Including Modified Seldinger Technique and Extended Dwell PIV (EPIV)
Effective Date:	July 23, 2015; September 8, 2016; May 19, 2017; February 13, 2019; August 21, 2020

I. Purpose

To provide policies and procedures specific to the NICU RN PICC Team members and neonatal physicians for the insertion of a PICC line.

II. Presumes Knowledge:

[WNH Standard Policy Statements.](#)

[WNH I.1 Infant Identification.](#)

[WNH S.4 Infant Safety Pause](#)

[NICU C.4 Use and Care of Central Venous Catheters and Peripherally Inserted Central Catheters.](#)

[NICU I.2 Intravenous Angiocatheter Placement.](#)

[NICU I.3 Changing of Intravenous Solution and Tubing.](#)

[NICU IV Compatibility Chart](#)

III. Clinical Qualifications for PICC Line Insertion

1. NICU RN PICC Team members and neonatal physicians must meet the following criteria prior to operating independently:

- Attend a comprehensive didactic course on PICC insertions and PICC management.
- Perform a simulation PICC insertion with unit-designated instructor.
- Assist/observe a PICC placement with unit-designated instructor.
- Place a minimum of six PICC lines under the supervision of an attending neonatologist, qualified neonatal fellow or member of the PICC Team. This includes: two upper extremity lines, two lower extremity lines and at least one of each size line (1.4 Fr and 2 Fr).
- At least four out of the six lines must be successfully placed PICC lines. Must be familiar with National Association of Neonatal Nurses publication Peripherally Inserted Central Catheters: Guidelines for Practice, 2nd edition.



- Must maintain competency once sanctioned independent by placing a minimum of five successfully placed PICC lines in a calendar year.

2. Licensed Independent Practitioner (LIP) order is required for PICC line placement.

3. A PICC line may be pulled back or advanced if sterility is maintained and only at the time of insertion

IV. Indication for PICC

- Neonates weighing less than 1500 grams with intravenous fluid needs
- Need for total parenteral nutrition, dextrose concentrations greater than 12.5%, continuous vasopressors or continuous analgesia sedation
- Infants unable to take sufficient po feedings for optimal growth and anticipated need for IV fluids for 5 or more days
- Inadequate vascular access
- Need for prolonged or long term IV antibiotic therapy
- Neonates with GI, congenital, or cardiac disorder

V. Indication for Extended Dwell Peripheral Intravenous Catheter (EPIV) 2.0Fr

- Inadequate vascular access
- Infant requiring IV antibiotic therapy and/or IV fluids but unable to place a CVC
- Infants requiring IV antibiotics and/or IV nutrition for up to 29 days

VI. Contraindications for Extended Dwell Peripheral Intravenous Catheter (EPIV)

- Infants requiring vesicant medications and/or central parental nutrition
o Examples of IV vesicant medications: Calcium, Dopamine, Dobutamine, Epinephrine, Vancomycin, Amphotericin B, Phenobarbital



VII. Equipment

- Appropriate PICC insertion kit
- Introducer needle or cannula
- Semipermeable Transparent Dressings
- Sterile barriers – drapes, gowns, 2 pairs of gloves (powder and latex free)
- Needleless connector
- Heparinized saline (1/2 NS with 1/2 unit heparin/mL)
- Angiocath of appropriate size for infant receiving PICC line
- Neonatal MST Kit
- EPIV Catheter (4-6cm)
- Stat Seal® Disc Extra Small
- BioPatch® disc (1.9 cm)

VIII. Procedure

A. Insertion using Direct Introducer

1. Review LIP order prior to PICC placement.
 - o Determination of need is done by LIP/RN.
2. Perform safety pause.
3. Verify the presence of a suitable vein.
 - o Vein selection is limited to upper and lower extremity veins.
 - o Not all infants are appropriate candidates. The vein needs to be of sufficient caliber to accommodate the large size of the catheter and introducer. Avoid using previously damaged or sclerotic veins due to increased risk of complications such as, difficulty threading catheter, phlebitis and/or infection.
4. Measure the length of the catheter to be inserted:
 - For **upper-body insertion**: Measure from the insertion site along the course of the vein, to the right of the sternal border, to the third intercostal space. Keep arm at naturally flexed position during measurement.



- For **lower-extremity insertion**: Measure from the insertion site along the course of the vein, to the right of the umbilicus and up to the xiphoid process.
 - Cut catheter to appropriate length using the guillotine with no more than 1-2 cm excess.
 - Inserting the catheter to a premeasured depth helps to ensure the desired placement is central or placed within the superior vena cava (SVC) or inferior vena cava (IVC).
5. Assemble all needed equipment and supplies prior to procedure set-up including observations checklist (CVL).
 6. Select the largest size catheter that will meet the infant's needs.
 - Catheter size 1.1Fr is available for ELBW infants if necessary
 - Catheter guide for infants weighing:
 - <1000 gms use 1.4 Fr.
 - 1000 – 1500 gms, use 1.4 or 2.0 Fr.
 - >1500 gms, use 1.9, 2.0 or 2.6 Fr catheter
 7. Select introducer.
 8. Offer pacifier and sucrose and administer pain medication as ordered.
 - Developmentally supportive care, swaddling, pacifiers and/or pharmacological support should all be considered prior to procedure.
 9. Clean work surface to be used for sterile field with aseptic wipes and allow area to dry completely prior to setting up sterile field.
 10. Apply hair cover and face mask.
 11. Perform hand hygiene using an alcohol-based waterless cleanser or antimicrobial soap and water.
 12. Open equipment and prepare sterile field.
 - Restrict traffic near sterile field to reduce the risk of contamination.
 13. Repeat hand hygiene then don sterile gown and gloves.
 - Maximal sterile barrier precautions, including the use of hair covering, face mask, sterile gown and gloves and large sterile drapes have been shown to reduce the risk of infection by 6-7 times over the use of sterile gloves and drapes alone.



14. Prepare the catheter by:
 - Attaching the clamp to the end of the catheter.
 - Flushing the catheter with sterile heparinized saline.
 - Use only a 10 mL syringe for flushing.
15. Position the infant and secure limb as needed.
 - Catheter introduction may be facilitated by altering alignment position of limbs/body.
16. For infants < 29 weeks: Prep insertion site and surrounding skin with povidone iodine (PI).
 - Begin prep at insertion site and prep in a circular motion for 30 seconds.
 - Repeat prep and drying 2 more times for a total of 3 times.
 - Allow PI to dry at least 2 minutes prior to insertion.
 - Clean site with wet alcohol after PI prep has been completed.
 - For infants > 29 weeks or 28 weeks plus DOL 7, use chlorhexidine (CHG) scrub over entire area.
 - A large prepped area reduces the risk of contamination. Wrap the foot or hand with sterile gauze to hold while prepping a wide area of the skin at and around the insertion site.
 - PI should be removed from the skin after the procedure to prevent tissue injury and the absorption of iodine percutaneously.
17. Place a sterile drape underneath and above the insertion area. Cover as much of the infant as possible without compromising visibility.
18. Apply sterile tourniquet.
 - Be sure to apply tourniquet to a prepped area of the skin to reduce likelihood of glove contamination. If gloves become contaminated, remove and reapply sterile gloves.
19. Insert the introducer, bevel up, at a 15-30° angle into the skin a few millimeters before anticipated entry into the vein.
 - Hold the skin taut below the level of insertion to prevent the vein from rolling.
 - Advance the introducer.
20. When blood return is apparent, advance the introducer and the needle together approximately 1/8-1/4 inch to assure the needle lumen is in the vein. Remove the needle from the introducer.
21. Observe for blood return.
 - Observe the color, speed of flow and pulsation of blood to detect arterial cannulation.



- Inserter may feel a pop or see blood return as vessel is cannulated. A vein can be cannulated without a blood return.
22. Remove the tourniquet after the introducer is well within the vein and blood return is evident.
 23. Using non-toothed forceps, thread the catheter through the introducer needle in 0.5 to 1.0 cm increments to the premeasured length.
 - Slow, controlled insertion can prevent venous irritation and the development of phlebitis. It also allows the catheter to float into the central circulation with the flow of blood. To minimize trauma to the vessel, threading the catheter should take at least 30-60 seconds or more.
 24. To facilitate insertion, gently flush with heparinized saline using a 10 ml syringe while threading the catheter if obstruction is suspected.
 25. Remove the introducer by applying digital pressure to the vein above the tip of the introducer to hold the catheter in position. Slowly remove the introducer until it is outside the skin several centimeters.
 26. Release the break-away needle per manufacturer's guidelines.
 27. Apply pressure to the puncture site until the bleeding stops.
 28. Ensure that the catheter is at the premeasured length.
 29. Aspirate for a blood return and flush the catheter.
 30. Secure the catheter to the site using no more than 2-3 sterile pieces of tape.
 - This maintains sterility while x-ray is being taken.
 31. Confirm that LIP has ordered stat x-ray to confirm line placement.
 32. Cover site with sterile drape during x-ray.
 32. Keep catheter patent by flushing it intermittently with heparinized normal saline flush with a 10 mL syringe until position of catheter tip is verified.
 - Intermittent flushing is done pending x-ray.
 33. Confirm catheter tip position with LIP.



34. Attempt to stop bleeding prior to dressing to decrease blood remaining on skin which can serve as a medium for bacterial growth.
 - a. If bleed persists apply Stat Seal Disc© Extra Small to insertion site.
 - b. Place disc on top of insertion site, brown side down/foam side with writing up. Hold continuous pressure on top of the foam for 2 minutes to form the seal.
 - c. Stat Seal Disc© will remain in place for up to 7 days post insertion. After 7 days the Stat Seal Disc© is replaced with a Biopatch and/or TSM dressing per gestational age guidelines.
35. Secure catheter to skin per PICC dressing procedure allowing for visualization of the site.
36. Refer to [NICU C.4 Use and Care of Central Venous Catheters and Peripherally Inserted Central Catheter](#)



37. Document the PICC insertion procedure in the infant's medical record. Record the following information:
 - Reason for PICC.
 - Vein utilized for insertion.
 - Brand, type size and lot number of catheter.
 - Length of catheter and final position.
 - Style and size of introducer.
 - Radiographic location of catheter tip • Infant's tolerance of procedure.

B. Insertion using Modified Seldinger Technique (MST)

1. Perform venipuncture with desired needle (24g angiocath or Neonatal MST kit introducer needle)
2. Observe for brisk blood return. For angiocath, remove the needle, leaving the plastic cannula in place.
3. Insert tip of guide wire from the Neonatal MST kit into the lumen of introducer needle or angiocath and gently advance into the vein lumen, depending on measured length prior to PICC Line placement. Leave excess guide wire exposed. Do not pass the guide wire beyond the shoulder in the upper extremity or beyond the groin in the lower extremity so as to prevent the catheter from entering the central circulation.



4. Release the tourniquet.
5. Remove the angiocath plastic cannula/introducer over the guide wire, taking caution not to remove the guide wire.
6. A small nick in the skin may need to be made at this time to accommodate the dilator sheath over the wire and into the skin and vessel. This can be done with a TB syringe needle or a sterile disposable scalpel. The nick should be made adjacent to the wire.
7. Pass the Neonatal MST kit tearaway introducer over the guide wire and into the vein, gently sliding all the way to the hub of the tearaway introducer. (guide wire must remain in control of the clinician at all times)
8. Remove the guide wire and dilator, leaving the tear-away sheath in place. Cover the tear-away sheath lumen with finger to prevent excessive blood loss or air embolus.
9. When ready to advance the catheter, remove finger from the tear away sheath lumen and immediately thread the catheter through the tear-away sheath to the desired pre-measured tip location.
10. Gently pull the tear-away sheath out a few centimeters over the catheter. Snap the tear-away sheath wings apart and peel away from the catheter and discard.
11. Advance remaining catheter into the vein lumen to ensure that the catheter is at the premeasured length.
12. Aspirate for a blood return and flush the catheter.
13. Secure the catheter to the site using no more than 2-3 sterile pieces of tape. This maintains sterility while x-ray is being taken.
14. Confirm that LIP has ordered stat x-ray to confirm line placement.
15. Cover site with sterile drape during x-ray.
16. Keep catheter patent by flushing it intermittently with heparinized normal saline flush with a 10 mL syringe until position of catheter tip is verified.
 - Intermittent flushing is done pending x-ray.



17. Confirm catheter tip position with LIP.
18. Attempt to stop bleeding prior to dressing to decrease blood remaining on skin which can serve as a medium for bacterial growth.
19. Secure catheter to skin per PICC dressing procedure allowing for visualization of the site.
 - Refer to [NICU C.4 Use and Care of Central Venous Catheters and Peripherally Inserted Central Catheters](#)
20. Document the PICC insertion procedure in the infant's electronic health record. Record the following information:
 - Reason for PICC.
 - Vein utilized for insertion.
 - Limb circumference
 - Brand, type, size and lot number of catheter.
 - Length of catheter and final position.
 - Style and size of introducer.
 - Radiographic location of catheter tip
 - Infant's tolerance of procedure.

C. Insertion of Extended Dwell Peripheral Intravenous Catheter (EPIV) using Seldinger Technique

1. Perform venipuncture using desired needle (22G angiocath or EPIV kit puncture needle).
 - EPIV catheters can be placed peripherally in both the upper and lower extremities or scalp
 - EPIV catheter tip should not terminate within central circulation or over joint spaces
2. Observe for brisk blood return. For angiocath, remove the needle, leaving the plastic cannula in place.
3. Insert tip of guide wire from the EPIV kit into the lumen of introducer needle or angiocath and gently advance into the vein lumen. Leave excess guide wire exposed.
4. Release the tourniquet.
5. Remove the angiocath plastic cannula/puncture needle over the guide wire, taking caution not to remove the guide wire.



6. Thread the EPIV catheter over the wire and into the vein, gently sliding all the way to the hub of the EPIV pulling back the wire as the EPIV catheter is advanced. (guide wire must be in control of the clinician at all times.)
 7. Remove the guide wire.
 8. Gently aspirate for blood return and flush the catheter.
 - Radiographic confirmation is not needed however the EPIV catheter tip must not terminate in central circulation: external measurement confirmation required
 9. Secure the EPIV catheter hub to skin per PICC dressing procedure allowing for visualization of the site.
 - Refer to [NICU C.4 Use and Care of Central Venous Catheters and Peripherally Inserted Central Catheters](#)
 - Apply a drop of SecurePortIV™ Catheter Securement Adhesive to the insertion site
 - EPIV dressing must be checked by PICC RN every 7 days and changed if the dressing becomes soiled or nonocclusive. A biopatch or stat seal can be used per protocol (Dressing must be changed every 7 days if it has a stat seal or biopatch).
 - EPIV catheters can remain in place for up to 29 days
 - To prevent line occlusions, EPIV catheters require a minimum KVO rate of 1mL/hr of heparinized fluids. Fluid rates above 1.0 ml/hr DO NOT require heparin.
 - EPIV can be HepLocked on a case by case basis and flushed with 1mL of heparin (10 units/mL) every 6 hours
 - Consult the PICC Team before heplocking.
 - EPIV catheters are maintained similarly to central lines and will be followed by PICC Team. IV fluid line changes should be changed per Central Line change policy
 10. Document the EPIV catheter procedure in the infant's electronic medical record. Record the following:
 - Reason for EPIV catheter
 - Number of stick attempts
 - Limb circumference
 - Brand, type, size and lot number of catheter
 - Infant's tolerance of procedure
- IX. **Education:** PICC Parent Education sheet (See PICC Parent Sheet)
- X. **Removal:**



1. PICC Removal
 - PICC line can be discontinued by a Fellow, Attending or member of the PICC team.
 - PICC line should be removed slowly, 1cm at a time. Grasp the catheter, not the hub as the removal progresses.
 - Measure the length of catheter removed to confirm the entire catheter was removed. The line should be compared to cut length and a note written to reflect the length of the line removed.
 - Cover the insertion site with Vaseline gauze and apply a sterile occlusive dressing for 24-48 hours to prevent air embolism.
2. EPIV Removal
 - EPIV may be removed by a Physician or RN
 - Remove dressing. Remove catheter – If line does not come out easily, soak site with sterile saline for 30 seconds and gently remove.
 - Document removal and note length of line removed (EPIVs are 4cm or 6cm in length).

XI. References

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