Newborn Critical Care Center (NCCC) Clinical Guidelines

Guidelines for Peripherally Inserted Central Catheters

INDICATIONS FOR PICC PLACEMENT

1. IV fluids and parenteral nutrition for 5 days or greater
2. Birth weight less than 1000 grams
3. Limited peripheral access
4. Need for anticipated access based on diagnosis
5. Antibiotic course of therapy > 5 days

RELATIVE CONTRAINDICATIONS FOR PLACEMENT (approval by attending required)

1. Sepsis
2. Short term access of < 5 days
3. Known thrombus in the vein

SITE SELECTION

- Proceduralist choice (arm, leg, axilla, scalp or jugular veins)
- Consider avoiding lower extremities if there is concern for gastrointestinal compromise
- Consult cardiologist for preferred sites for infants with CHD

Placed by NNP, Fellow, or Attending MD only

PROCEDURE FOR NEONATAL PICC PLACEMENT - See Appendix A

GUIDELINES FOR NEONATAL PICCs OUTSIDE NCCC
Guideline for Neonatal PICCs in PICU, 5CH, 6CH, and 7CH

LINE PLACEMENT CONFIRMATION BY RADIOGRPAH

- Accurate placement for lines placed in the upper extremities is the upper right atrium or SVC/right atrial junction
    - *If the PICC is placed in the upper extremity the arm needs to be flexed and adducted to the side to confirm optimal positioning and placement.*
- Accurate placement for lines placed in the lower extremities is in the inferior vena cava between the lower right atrium and T11 (T9-11).
    - *Consider obtaining lateral radiographs in addition to the typical anterior radiographs to confirm lower extremity PICC tip placements remain within the IVC*
- If the line needs to be adjusted ≥ 1 cm, then a radiograph should be repeated to confirm accurate placement

DOCUMENTATION

- Document insertion/attempt using the PICC line note in EPIC and route to attending
- Document need for access in the daily progress note; include date of recent radiograph for placement confirmation

- Document dressing changes

MAINTENANCE

- Accurate placement is confirmed by radiograph every 2 weeks while the line is in place
- Consider removal if line is no longer in central position
- Dressing changes per PICC line dressing guidelines
- Dressing changes can be performed by PICC RN, NP, Fellow, or Attending MD

NURSING CONSIDERATIONS FOR LINE CARE

- PICC line site/dressing is assessed every shift for any signs of compromise or complications
- If the line/dressing is compromised, the PICC RN, NP, Fellow, or Attending MD is directly notified of needed dressing change
- Access PICC line using aseptic technique
- Always use heparinized fluids of (0.5 units/mL) or heparin lock per UNC nursing guidelines
- Consider thrombolytic therapy (such as TPA) on case-by-case basis – refer to UNC Hospitals CVAD policy for further information

LINE PRACTICES

- Never reinforce the PICC dressing with extra tape or Tegaderm. Notify PICC RN, NP, Fellow, or Attending MD of need for immediate dressing change
- Never draw blood from the PICC line except with written NP/MD order
- Never infuse PRBCs or any blood product via PICC line
- Never use smaller than a 5 mL syringe when flushing the PICC line
- PICC catheters ≤ 2 French are not safe for discharge purposes
- Never clamp a PICC line unless utilizing manufacturer's clamp

DISCONTINUATION

- When deemed no longer needed by primary team
- If infant develops a complication related to the PICC line
- NP/MD must place an order to discontinue the line
- Cut length will be checked prior to removal (documented in insertion note)
- PICC RN, NNP, Fellow, or Attending MD will discontinue the line

CATHETER REMOVAL PROCEDURE

1. Cleanse PICC dressing and surrounding area with chlorhexidine solution
2. Wash hands and apply 2 pair of sterile gloves
3. Remove any Steri-strips on the outside of the dressing
4. Stretch outside edges of Tegaderm for easy removal
5. Remove Tegaderm towards insertion site

6. Remove outer sterile glove
7. Cleanse area around catheter using chlorhexidine solution
8. Slowly remove catheter by 0.5-1 cm increments
9. Cleanse insertion site area again using chlorhexidine solution
10. Apply a sterile occlusive dressing for 24-48 hours

VIDEO – Neonatal PICC Insertion

PICC Placement in the Neonate NEJM - YouTube

(YouTube video must be accessed from outside the hospital network)

References:

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2. Kirse, A.C., Kamitsuka M.D.. (2005) Peripherally Inserted Central Catheter Using the Saphenous Vein: Importance of Two-View Radiographs to Determine the Tip Location. *Journal of Perinatology* (**25),** 674–676. doi:10.1038/sj.jp.7211363
3. Sharpe E, Pettit J, Ellsbury DL. A national survey of neonatal peripherally inserted central catheter (PICC) practices. *Adv Neonatal Care*. 2013 Feb;13(1):55-74. PMID: 23360860.
4. Sharpe E, Curry S, Wyckoff M. Peripherally Inserted Central Catheters: Guideline For Practice 4th edition. National Association of Neonatal Nurses. 2022
5. van Rens M, Nimeri AMA, Spencer TR, Hugill K, Francia ALV, Olukade TO, Mahmah MA. Cyanoacrylate Securement in Neonatal PICC Use: A 4-Year Observational Study. Adv Neonatal Care. 2022 Jun 1;22(3):270-279. doi: 10.1097/ANC.0000000000000963. Epub 2021 May 27. PMID: 34743117.
6. Wortham, BM, Rais-Bahram, K. Umbilical Vein Catheterization. In MacDonald, M. &Ramasethu, R, eds. Atlas of Procedures in Neonatology, 4th ed. Philadelphia, PA: Wolter Kluwer/Lippincott Williams&Wilkins; 2007. p. 177-185.
7. Wyckoff MM, Sharpe E. Peripherally Inserted Central Catheters: Guidelines for Practice, 4th Edition. NANN 2022.

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APPENDIX A

Procedure for Neonatal PICC Placement

1. Determine indication for a PICC.
2. Review the procedure with parents or guardians and ensure informed consent is obtained
3. Utilize a standardized central line insertion checklist.
4. Select the vein to be used for the procedure.
    a. Transillumination or ultrasound should be used to aid vessel and site selection. Warm packs or a loose tourniquet also may enhance visibility.
5. Measure the length of the catheter to be inserted.
    a. Measure from the insertion site along the course of the vein, to the right of the sternal border, to the third intercostal space. If inserting the catheter through an arm vein, extend the arm at a 90° angle for measuring or along the natural vein path with the extremity in the most frequent position of rest.
    b. 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.
6. Assemble the needed equipment and supplies before the procedure. Clean the procedure/PICC cart.
7. Select appropriately sized catheter (1 Fr, 1.4 Fr, or 1.9 Fr)
8. Implement comfort measures and pain management pre- and intraprocedurally, as appropriate.
9. Position the patient and restrain as needed using developmentally appropriate support
    a. Arm insertion = turn head towards extremity you are sticking, position chin to shoulder, abducting the arm makes the venous course straighter and facilitates entry into the axillary and subclavian veins.
    b. Axillary vein - Abduct the arm 100°–130° or place the infant's hand by their head and puncture parallel and inferior to the artery.
    c. Femoral – low abdominal pressure and frog legged
10. Don your hat and mask. Open supplies and equipment, preparing a sterile field.
11. Perform hand hygiene using antimicrobial soap and water. Ensure sterile towel is used for drying hands.
12. Don sterile gown and gloves.
13. Prepare the catheter. Trim and flush the catheter.
14. Prep the insertion site and surrounding skin with chlorhexidine gluconate (CHG) or povidone iodine per facility protocol. Allow solution to dry 3 minutes.
    a. A large prepped area reduces the risk of contamination. The infant's hand or foot may be wrapped in sterile gauze or a glove so that a large portion of the extremity can be prepped.
15. Place a sterile drape underneath and above the insertion area.
16. Introduce vascular visualization equipment to the sterile field.
17. Apply a sterile tourniquet (extremity insertion) or digital pressure proximal to the insertion site (scalp or axillary vein insertion).

18. Insert the introducer bevel at a 15°–30° angle into the skin a few millimeters from the anticipated entry point into the vein. Hold skin taut.
19. Observe for blood return.
    a. A blood return may not be visible with some introducers or if the infant is in a low perfusion state. Sometimes the blood return is not evident until the catheter is advanced.
20. Remove the tourniquet gently after the introducer is well within the vein and blood return is evident if used.
21. Thread the catheter.
    a. 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.
    b. If resistance is encountered, consider flushing the catheter while attempting to advance in small increments.
22. Remove the introducer.
23. Release the break-away needle or peel-away sheath introducer per the manufacturer's guidelines.
24. Apply pressure to the puncture site until the bleeding stops.
25. Ensure that the catheter is at the premeasured length.
26. Aspirate for a blood return and flush the catheter.
27. Attach the Luer-lock extension.
    a. Extension sets applied at the time of insertion may be considered part of the catheter and do not need to be routinely changed unless clinically indicated or recommended by the manufacturer
28. If desired, temporarily secure the catheter hub with Steri-strips. If possible, maintain the sterile field while waiting for verification of tip location.
29. Maintain catheter patency by flushing it intermittently
    a. Pulsatile flush burst to maintain patency and reduced endoluminal contamination and bacterial colonization
30. Verify the location of the catheter tip with radiography.
31. Place the catheter tip in the superior vena cava, SVC cavo-atrial junction, or thoracic inferior vena cava.
    a. Position for the superior vena cava has been described as the T3–T5 level, but it varies depending on radiographic technique and infant anatomy. Appropriate catheter tip placement for lower extremities is in the inferior vena cava above the level of the diaphragm, below the right atrium.
    b. Neonates with lower-extremity catheters who developed major venous thromboembolism were noted to have catheter tips located below L1. There is increased risk of catheter malposition and neurologic complications with catheter tips placed at L3 and lower.
32. Reposition the catheter, if necessary.

33. Remove povidone iodine with sterile water or saline. If desired, remove CHG skin prep with sterile saline.
    a. Currently no data to support the removal of CHG contained in an alcohol base. Removal of CHG may not be possible because of its ability to bind to the skin.
34. Control/stop bleeding, place 1 small drop of tissue adhesive, apply 2 steri-strips over catheter hub, and then secure the catheter to the skin with Tegaderm dressing. Chevron the line and place 2 steri-strips over the base of the chevron.
    a. Any external length of catheter should be arranged with a slight curve as it exits the skin. This minimizes the risk of tension causing outward migration or allowing inward migration with movement.
    b. Dressing should not overlap itself or be wrapped completely around the extremity because this may lead to venous stasis and edema.
35. Document the procedure in the medical record.