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 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 Analgesia for Invasive Procedures.
- 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 (1.1 Fr and 1.9 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. 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 IV port adapter (clave)
- Heparinized saline (1/2 NS with 1/2 unit heparin/mL)
- Angiocath of appropriate size for infant receiving PICC line
- Neonatal MST Kit

VI. Procedure

A. Insertion using Direct Introducer

1. Review LIP order prior to PICC placement.
2. Perform safety pause.
3. Verify the presence of a suitable vein.
   - Vein selection is limited to upper and lower extremity veins.

1. Determination of need is done by LIP/RN.
2. Safety Checklist
3. The vessel needs to be of sufficient size and location 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
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

5. Assemble all needed equipment and supplies prior to procedure set-up including completing online the observations checklist (CVL).

6. Select the largest size catheter that will meet the infant’s needs.

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<tr>
<td>4.</td>
<td>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).</td>
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| 6. | Catheter guide for infants weighing:  
   - less than 1000 grams use 1.1 Fr catheter.  
   - 1000 grams – 1500 grams, use 1.1 or 1.9 Fr catheter  
   - greater than 1500 grams, use a 1.9, 2.0, or 2.6 Fr catheter |
| 8. | Developmentally supportive care, swaddling, pacifiers and/or pharmacological support should all be considered prior to procedure. |

7. Select introducer.

8. Offer pacifier and sucrose and administer pain medication as ordered

9. Clean work surface to be used for sterile field with aseptic wipes and allow to dry completely prior to setting up sterile infection.
<table>
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<tr>
<th>Step</th>
<th>Description</th>
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<tr>
<td>10.</td>
<td>Both operator and observer wear hair cover and face mask.</td>
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<tr>
<td>11.</td>
<td>Apply hair cover and face mask.</td>
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<td>12.</td>
<td>Perform hand hygiene using an alcohol-based waterless cleanser or antimicrobial soap and water.</td>
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<tr>
<td>13.</td>
<td>Open equipment and prepare sterile field.</td>
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<tr>
<td>14.</td>
<td>Repeat hand hygiene then don sterile gown and gloves.</td>
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| 15.  | Prepare the catheter by:  
  - Attaching the needless connector to the end of catheter  
  - Flushing the catheter with sterile heparinized saline |
| 16.  | Position the infant and secure limb as needed. |
| 16.  | For infants < 29 weeks: Prep insertion site and surrounding skin with polyvinylpyrrolidone (PVP).  
  - Begin prep at insertion site and prep in a circular motion for 30 seconds.  
  - Repeat prep and drying 2 more times  
  - PVP should be removed from the skin |
| 16.  | Catheter introduction may be facilitated by altering alignment position of limbs/body. |
| 16.  | 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. |

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for a total of 3 times

- Allow PVP to dry at least 2 minutes prior to insertion
- Clean site with wet alcohol after PVP prep has been completed.

For infants > 29 weeks or 28 weeks plus DOL 7, use 2% chlorhexidine (CHG) scrub over entire area.

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.

19. Perform venipuncture with bevel up, at a 15-30 degree 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.
   - **DIRECT INTRODUCER METHOD:** 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.
   - **MODIFIED SELDINGER TECHNIQUE (MST) METHOD:** See insertion procedure below.

20. Observe for blood return.

- after the procedure to prevent tissue injury and the absorption of iodine percutaneously.

18. 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.

20. Inserter may feel a pop or see blood return as vessel is cannulated. A vein can
- Observe the color, speed of flow and pulsation of blood to detect arterial cannulation.

21. Remove the tourniquet after the introducer is well within the vein and blood return is evident.

22. Using non-toothed forceps, thread the catheter through the introducer needle in 0.5 to 1.0 cm increments to the premeasured length.

23. To facilitate insertion, gently flush with heparinized saline using a 10 ml syringe while threading the catheter if obstruction is suspected.

24. 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.

25. Release the break-away needle per manufacturer’s guidelines.

26. Apply pressure to the puncture site until the bleeding stops.

27. Ensure that the catheter is at the premeasured length.

28. Aspirate for a blood return and flush the catheter.

be cannulated without a blood return.

22. 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- to 60 seconds or more.
29. Secure the catheter to the site using no more than 2-3 sterile pieces of tape.

30. Confirm that LIP has ordered stat x-ray to confirm line placement.

31. Cover site with sterile drape during x-ray.

32. Keep catheter patent by flushing it intermittently with heparinized NS flush with a 10 ml syringe until position of catheter tip is verified.

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.

35. Secure catheter to skin per PICC dressing procedure allowing for visualization of the site.

36. Document the PICC insertion procedure in the infant’s electronic health record. Record the following information:
   - Reason for PICC
   - Vein of 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

29. This maintains sterility while x-ray is being taken.

32. Intermittent flushing is done pending x-ray.

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

7. 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.

8. 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.

9. 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.

10. Advance remaining catheter into the vein lumen to ensure that the catheter is at the premeasured length.

11. Aspirate for a blood return and flush the catheter.
12. 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.

13. Confirm that LIP has ordered stat x-ray to confirm line placement.

14. Cover site with sterile drape during x-ray.

15. 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.

16. Confirm catheter tip position with LIP.

17. Attempt to stop bleeding prior to dressing to decrease blood remaining on skin which can serve as a medium for bacterial growth.

18. 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

19. 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.

VII. Education: PICC Parent Education sheet (See attached)
VIII. References


