PERIPHERAL INTRAVENOUS CATHETER GUIDELINES

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Approved by: Kathleen Patrick, President

I. POLICY

A. Peripheral intravenous catheters (PIVCs) are inserted and reside in the peripheral veins.

1. **Short PIVCs** are over-the-needle catheters with a hollow metal stylet (needle) positioned inside the catheter. The PIVC is inserted into and resides in superficial peripheral veins.
2. **Long PIVCs** are inserted via traditional over-the needle catheters or with more advanced techniques. Long PIVCs are inserted into either superficial or deep peripheral veins when the short PIVC is not long enough to adequately canulate the available vein.
3. **Midline peripheral catheter (midline)** is inserted into a peripheral vein of the upper arm (basilic, cephalic or brachial vein), with the terminal tip of the catheter located the level of the axilla.

B. Infusion via PIVC

1. All infusions administered through PIVCs should be isotonic and of physiological pH to reduce vascular endothelial damage (cellular damage or death). There is no recognized safe peripherally administered pH or osmolarity limit.
2. PIVCs are not appropriate for vesicants, irritants, cardiac medications, vasopressors, parenteral nutrition (PN), and selected therapies per manufacturer recommendations.
3. Expected duration of infusion therapy to be assessed for appropriateness of peripheral vein therapy and catheter type.

C. Nursing Considerations

1. Insertion and removal of vascular access devices (VADs) are performed by clinicians within their scope of practice, licensure, competency, in accordance with organizational policies and procedures, and according to manufacturers' recommendations.
2. The nurse clinician to teach Aseptic Non-Touch Technique (ANTT) according with Nursing policy on *Aseptic Non-Touch Technique (ANTT)* when providing PIVC care, both during insertion and post insertion care.

II. PROCEDURE

A. Insertion of PIVC

1. The veins of the forearms and upper extremities are most appropriate for IV therapy. In adults, the lower extremities may be used when necessitated by the patient's condition, with a physician's order or in the event of an emergent insertion. Lower extremity veins may be used in infants whenever necessary.

   a. Start with a vein most distal, allowing subsequent sites to be placed proximally as needed. Each successive cannulation to be placed proximal to previous attempt.
   b. If possible, select vein in non-dominant arm.
   c. Choose site with stabilization by subcutaneous tissue, muscle, and skeletal support.
   d. Use non-dominant arm/hand when possible.
   e. Allow patient input for site selection.
   f. Avoid PIVC insertion in locations of:

      1) Flexion
      2) Pain on palpation
      3) Compromised skin (including sites distal to compromised skin)
      4) Extremities with an infection
      5) Site of planned procedure, including radiation therapy.
      6) Compromised veins (e.g., previous cannulation, bruised, reddened/streaked, infiltrated, sclerosed, corded, or engorged)
      7) Increased risk of nerve damage, such as:
         - Cephalic vein at the radial wrist (superficial radial nerve)
         - Inner aspect of the wrist (median nerve)
         - At/above the antecubital fossa (median and anterior interosseous nerve and lateral and medial antebrachial nerves)
      8) Presence or risk of lymphedema
         - Ipsilateral upper extremities in patients with lymphedema
         - Increased risk for lymphedema (e.g., axillary surgical dissection or radiation therapy)
      9) Paralysis or hemiparesis due to alteration in normal blood flow and decreased sensation.
      10) Planned or existing arteriovenous fistula (AVF) or arteriovenous graft (AVG) for treatment of renal dysfunction.

2. In the presence of an implanted vascular access port (Port), the port is the preferred method of venous assess over placing a PIVC, unless port use is contraindicated.

3. After 2 unsuccessful attempts, escalate to a clinician with a higher skill level. If no skilled

clinician is available, consult with MD with possibility of orders for 3rd attempt received. Multiple unsuccessful attempts cause pain to the patient, delay treatment, limit future vascular access, increase cost, and increase the risk for complications.

4. Use vascular visualization technology (e.g., near infrared, ultrasound) to increase first attempt success and reduce insertion related complications in all patients, but particularly in patients with difficult intravenous access (DIVA) status.
   a. Ultrasound technology can measure the catheter-to-vessel ratio prior to insertion of a PIVC to ensure a catheter-to-vessel ratio of less than 45% to ensure adequate blood flow.

5. Tourniquet should be patient single use.

6. A new, sterile PIVC is used for each catheterization attempt.

7. Utilize pain reduction measures to reduce pain from PIVC insertion.

8. Use appropriate aids to promote vascular distention during insertion, such as a single patient tourniquet, warming, or blood pressure cuff.

9. The PIVC system is to be flushed before and after each infusion adhering to the Nursing policy on ***Flushing and Locking Catheters***.

10. Needleless injection caps on PIVCs should be cleansed with alcohol prep prior to each access, scrubbing the hub for 30 seconds and allowing it to dry for 60 seconds.

11. For medication administration and tubing changes refer to Nursing policies on ***Medication Administration*** **and** ***Flushing and Locking Catheters*****.**

12. Do not re-advance catheters that have migrated out of the vein.

13. Insertion site to be assessed daily by the patient/caregiver, after education. Clinician to assess site during each home visit. Refer to Nursing policy on ***Assessment and Management of Infiltration and Phlebitis***

    a. Nurse to assess the PIVC insertion site for signs and symptoms of complications and remove immediately when complications are assessed or no longer required for therapy. PIVC removal should NOT be based on dwell time alone, but rather on assessment findings.

    b. Immediately remove the PIVC in the following situations:
       1) No longer clinically needed for medication administration.
       2) Suspected nerve damage: patient reports severe pain on insertion (e.g., electrical shock-like pain) or paresthesia (e.g., numbness or tingling). Must notify the provider of suspected nerve damage.

3) Inadvertent arterial puncture: remove the catheter and apply pressure to the peripheral site until hemostasis is achieved. Assess circulatory status and, if impaired, notify the provider promptly.
4) Suspected contamination due to break in ANTT
5) Unresolved complications, such as:
    - Pain during dwell, with or without flushing
    - Lack of blood return due to mechanical obstruction that cannot be consistently and readily restored)
    - Assessment of edema, erythema, leakage, hematoma, skin color and temperature changes.
    - Palpable cord
    - PIVC is no longer functioning in an optimal fashion.

c. Insertion site to be assessed daily by the patient/caregiver, after education. Patient/ caregiver to be instructed to notify their health care team of abnormal assessment findings.

d. Clinician to assess site during each home visit.

1) PIVC with an absent blood return, increase the frequency of assessment of the insertion site and the venous pathway of the VAD to minimize the risk and severity of complications, such as infiltration, extravasation, and occlusion.

III. SHORT PERIPHERAL INTRAVENOUS CATHETER

A. Overview

1. The short PIVC catheter provides a ready route for intermittent medication administration while providing freedom of movement between infusions.
2. A butterfly needle may be substituted for a short PIVC when administering a single dose and must be removed immediately following infusion.
3. Peripheral catheters are inserted per physician order and following protocol.
4. Select the smallest gauge PIVC that will accommodate the prescribed therapy. Catheter length should be long enough to achieve 2:1 catheter (length) to vein ratio (with 2/3 of the catheter seated in the vein).
5. The catheter selected should be the smallest gauge to support infusion (24G. 22G) and length to allow 2/3 of the catheter to dwell in the vein.
6. A butterfly needle may be substituted for a peripheral catheter when administering a single dose and must be removed following infusion.
7. Short PIVC site selection to be based on depth of vein and expected duration of infusion therapy.

a. When possible, use a forearm vein to prolong the dwell time, reduce pain during dwell, and reduce overall device failure. Choose veins found on the dorsal and ventral surfaces of the upper extremities.
b. Hand veins are not preferred, and are for short-term therapies (e.g., less than 24 hrs).

B. Supplies

1. May include, but not limited to:

   a. IV start kit
   b. Short PIVC over needle with safety device
   c. Sterile 10-mL prefilled syringe
   d. Short extension set (7- 8 inches) with a needless injection cap.

C. Insertion Procedure

1. Verify provider's order and review patient's record for allergies, past medical history and rational for need for short PIVC.
2. Perform hand hygiene in accordance with Infection Control policy on Hand Hygiene.
3. Confirm patient's identity with 2 identifiers.
4. Provide privacy.
5. Explain procedure to patient.
6. Clean workspace and gather supplies. Always Inspect all IV equipment and supplies prior to use for expiration, defect or compromised integrity.
7. Wash hands in accordance with Infection Control policy on Hand Hygiene.
8. Open and prepare supplies according to ***Infection Control policy on ANTT***. Standard-ANTT to be observed:
   a. May wear non-sterile gloves, but do not touch/palpate the insertion site after skin antisepsis. If palpation is required, sterile gloves must be donned.
   b. Ensure needless injection cap is connected to the extension tubing, and prime set with saline.
   c. Do not prime if drawing labs from newly PIV catheter.
9. Apply a tourniquet to upper extremity to dilate and assess veins. Apply the tourniquet loosely (or do not use) in patients who bruise easily, are at risk for bleeding, have compromised circulation or fragile skin. Check for a pulse distal to the tourniquet location, to ensure it is not too tight.
10. Assess veins by light palpation and visualization for preferred site selection. Do not select vein if it feels hard or ropelike. May need to place arm in dependent position for several seconds or stoke the arm downwards to dilate the vein.
11. Release the tourniquet for site preparation for canulation.

12. Prepare the site:
    a. If the intended insertion site is visibly soiled, first clean with soap.
    b. Clip hair around the insertion site if needed to facilitate dressing application after catheter insertion.
    c. Administer a topical anesthetic, if indicated and prescribed to reduce pain and anxiety, 30 minutes prior to venipuncture.
    d. Elder alert: Friction from antiseptic cleansing may irritate or damage skin.
13. Perform hand hygiene again.
14. Don gloves for venipuncture.
15. Prepare the site with an antiseptic, adhering to ANTT during catheter insertion
16. Reapply the tourniquet.
17. Use visualization technology as available.
18. Anchor the vein by stretching the skin taut below/distal to the puncture site with your non-dominate hand to stabilize the vein.
19. Alert the patient before inserting the PIV.
20. Perform PIV insertion
    a. Insert the short PIV on top of vein at a 10–15-degree angle with the bevel up.
    b. Puncture the skin and anterior vein wall, watching for blood flashback in the catheter chamber.
    c. Continue to hold the skin taught and advance the catheter by using the push-off tab to separate the catheter from the needle stylet. Advance the catheter into the vein. Level the needle by tipping the tip upward, to prevent accidental puncture of back of the vein. Do not touch the catheter hub to avoid contamination.
    d. Release the tourniquet.
    e. Activate the device's safety mechanism, following the manufacturer's instructions for use.
    f. Attach primed extension set and injection cap to the catheter hub and tighten the luer lock.
    g. For catheters without blood control technology, compress the patient's skin well above the catheter tip to stop blood flow when connecting the extension set.
    h. Perform a vigorous mechanical scrub of the extension tubing hub for at least 30 seconds using an antiseptic pad. Allow it to dry completely for 60 seconds.
    i. Confirm the PIVC has blood return and flush with saline as ordered.
        1) Blood return confirms correct placement in the vein.
        2) Assess the color of the whole blood.
        3) If no blood return obtained, take steps to resolve obstruction.
    i. Apply a transparent semipermeable dressing to the insertion site.
    j. Apply engineered stabilization device if available, prior to applying dressing.
    k. Secure extension tubing with tape.

l. Label the dressing with the current date & initials.

m. Discard used supplies.

n. Doff and dispose of gloves.

o. Perform hand hygiene.

p. Document the procedure.

IV. LONG PERIPHERAL INTRAVENOUS CATHETER

A. Overview

1. To be utilized when all aspects of a short PIVC are met, but the vessel is difficult to palpate or visualize. Visualization technology is recommended for placement. Evaluate depth of vessel when choosing a long PIVC to ensure sufficient catheter lies within vein, allowing for 2/3 of the catheter length to dwell in the vein.
2. Use similar criteria as for adults, and based on expected infusion therapy, remove PIVC as soon as no longer needed.
3. Refer to Nursing policy on Peripherally Inserted Central Catheter Dressing and Cap Change policy for step-by-step instruction for catheter care.
4. The catheter selected should be the smallest gauge to support infusion (24G. 22G) and length to allow 2/3 of the catheter to dwell in the vein.
5. Often placed in facility prior to home infusion therapy start of care but may be placed in the home by a trained clinician.
6. Follow visualization technology manufacture recommendations & adhere to above SHORT PIVC placement instructions.

V. REMOVAL OF SHORT AND LONG PERIPHERAL INTRAVENOUS CATHETER

A. Supplies Needed:

1. Gloves (non-sterile)
2. Sterile 2X2 gauze
3. Adhesive dressing or Band aid
4. Tape

B. Procedure:

1. Verify provider's order for removal of catheter, or protocol order for end of treatment.
2. Perform hand hygiene in accordance with Infection Control policy on Hand Hygiene.
3. Confirm patient's identity with 2 identifiers.
4. Provide privacy.
5. Educate patient/caregiver on procedure.

6. Clean workspace and gather supplies. Always Inspect all IV equipment and supplies prior to use for expiration, defect, or compromised integrity.
7. Wash hands in accordance with Infection Control policy on Hand Hygiene.
8. Don gloves.
9. Discontinue all infusates and clamp extension set.
10. Remove dressing from insertion site. Remove securement device if present.
11. Place sterile 2X2 gauze over the catheter insertion site and withdraw catheter parallel to the skin using gentle, even pressure.
12. Apply pressure until hemostasis is achieved and apply gauze and tape or Band-aid.
13. Inspect catheter: intact, not jagged, and appropriate length.
14. Discard used supplies.
15. Doff and dispose of gloves.
16. Perform hand hygiene.
17. Document the procedure.

VI. MIDLINE PERIPHERAL CATHETER

A. Overview

1. Midline catheters are typically placed at a facility prior to home infusion therapy, for therapies appropriate for peripheral administration. Midline catheters may be inserted in a patient's home, and do not require radiological placement confirmation.
2. A Physician's order is required for midline insertion.
3. Midline catheter length chosen to achieve appropriate tip location (level of the axilla) relative to the site of insertion. Midline tip to be positioned distal to the axillary fold to reduce the risk of complications associated with catheter tip crossing a joint.
4. Measure baseline circumference of the extremity upon insertion or start of care, noting location of measurement to ensure consistency. Assess circumference by measurement when edema or signs and symptoms of deep vein thrombosis (DVT) are present, noting the location and characteristics of edema.
5. Refer to Nursing policy ***Peripherally Inserted Central Catheter Dressing and Cap Change*** for step-by-step instructions for catheter care.
6. Refer to Nursing policy ***PICC and Midline Removal*** for step-by-step instructions for removal.
7. To reduce complication risk, the least number of lumens that will accommodate the anticipated infusion therapy should be utilized.
8. Midline dwell time recommendations vary based on manufacturer.
9. Limited evidence is available regarding techniques, outcomes, and hemostasis rate when drawing blood specimens from Midlines. Labs may be drawn from a Midline, but is not recommended.
10. Avoid taking blood pressure or placing a tourniquet over the extremity with a Midline catheter.

VII. PATIENT/CAREGIVER EDUCATION

A. Patient/caregiver to be educated on:

1. Examine their PIVC site at least daily and with each dose administered.
2. Notify their health care team if the PIVC site exhibits redness, swelling, or discomfort.
3. Notify their healthcare team if the PIVC dressing becomes wet.
4. Notify their health care team if the infusion stops, slows or the pump alarms.
5. Procedure steps before placing, removing, or providing care to PIVC.
6. If the patient/caregiver is self-administering intravenous medications, instructions on how to administer the therapy.

VIII. VASCULAR VISUALIZATION

A. Use vascular visualization technology (e.g., near infrared, ultrasound) to increase first attempt success and reduce insertion related complications in all patients, but particularity in patients with DIVA.

1. Ultrasound technology can measure the catheter-to-vessel ratio prior to insertion of a PIVC to ensure a catheter-to-vessel ratio of less than 45% to ensure adequate blood flow.
2. Assess the patient's medical history to determine the need for vascular visualization technology to assist in locating appropriate PIVC insertion sites.
3. Use ultrasound to assess diameter and length of intravenous path, as well as other anatomical structures prior to insertion to identify vascular anomalies, and location of other structures, such as valves, arteries, and nerves.
4. Clinicians to be trained in vascular visualization equipment use, with documented assessment of competency in the use of vascular visualization technology for insertion of VADs.
5. Consider the use of visible light devices that provide transillumination of the peripheral veins, though they have limitations with increased thickness of subcutaneous tissue. Only use devices with cold light sources for vascular visualization.
6. Use near infrared (nIR) light technology to aid PIVC insertion in children and adults with DIVA. nIR provides information, such as vein bifurcations, tortuosity, palpable but nonvisible veins, location of venous valves, etc.
7. During vein assessment (intact skin and no needle puncture) a probe barrier is not required with use of single-use gel.
8. Probe use:
    a. For PIVC insertion, a *sterile* probe cover is required with the use of a *sterile* single-use gel packet.
    b. The probe must be disinfected before and after each use, regardless of probe barrier use, to reduce the risk of contamination.
    c. Always refer to manufacturers' directions for use.

IX. DOCUMENTATION OF PIVC

A. Documentation to include the following:

1. Date & time of PIVC insertion.
2. Catheter gauge and length of PIVC
3. Insertion site assessment
4. Device functionality (patent & blood return)
5. Site assessment
6. Dressing and securement method
7. Use of antimicrobial disc
8. Dressing changes and care
9. Infusion therapy being provided, including:
    a. Flushing and locking (solution and volume)
    b. Mode of administration
10. Teaching provided to patient and family, including their understanding, and any follow up education required.
11. Provider order and reason for PIVC insertion (IV medication administration)
12. Complications, with subsequent interventions, and patient response
13. For Midline Catheters:
    a. Number of lumens
    b. Arm circumference at the time of insertion & when edema or other signs of thrombosis are assessed. Increase of 3cm to be reported to the provider. NOTE: always document the location of the measurement.
    c. External length of the lumen. Increase of 2cm from placement to be reported to the provider due to line migration.

B. Documentation at the time of PIVC placement to include:

1. Number of attempts
2. Preparation of skin and ANTT technique followed
3. Visualization technology, if used
4. Pain management intervention(s)
5. Patient's tolerance of procedure

C. Documentation at the time of PIVC removal to include:

1. Length of PIVC (compared to length documented at time of insertion)
2. Condition of catheter/catheter tip upon removal
3. Condition of site
4. Reason for PIVC removal
5. Dressing applied
6. Interventions during removal (e.g., suture removal, cultures)
7. Patient's tolerance of removal procedure

X. TRAINING

This policy will be posted on the Company shared drive.

XI. REFERENCES

1. Nickel B, Gorski L, Kleidon T, et al. Infusion Therapy Standards of Practice, 9th Edition. *J Infus Nurs*. 2024;47(1S Suppl 1):S1-S285. doi:10.1097/NAN.0000000000000532
2. Lippincott, Williams, & Wilkins. (2023) Lippincott Nursing Procedures, 9th Edition. Retrieved 1/15/2024. Intermittent infusion device insertion, accessed at: **https://www.r2library.com/resource/detail/1975178580/ch0009s0136**