Infusion Therapy – Peripherally Inserted Central Catheter (PICC) Maintenance and Management of Potential Complications

SECTION: 25.34

Strength of Evidence Level: 3

PURPOSE:
To maintain a patent intravenous (IV) access for continuous or intermittent drug, fluid infusion or blood withdrawal via a peripherally inserted central catheter (PICC).

Prevention, early detection and management of central venous catheter related complications.

CONSIDERATIONS:
1. The PICC is an IV access device inserted into the peripheral vascular system. The catheter may be advanced into the Vena cava. Vena cava placement is confirmed by radiology. The catheter provides for ready access to the patient’s circulation for administering drugs, blood products and total parenteral nutrition.
2. Intermittently accessed PICC lines are flushed with 3 mL of heparin solution 100 units/mL every 24 hours, after each use or as prescribed by physician.
3. The intermittent injection port will be changed once a week or PRN.
4. When medication is administered in order to eliminate problems of drug incompatibility, the SASH method of flushing is utilized:
   - S – Saline.
   - A – Administer drug/solution.
   - S – Saline.
   - H – Heparin.
   Unless otherwise ordered by a physician, 3-5 mL of normal saline will be used.
5. The initial (post-insertion) dressing should be over the insertion site to absorb any post insertion bleeding or drainage. A transparent dressing should be placed over this. Subsequent dressing changes do not require the use of gauze unless excessive drainage is present. A Biopatch may be applied at exit site with each dressing change.
6. Dressing change is performed every 7 days or PRN using a transparent permeable adhesive dressing. Patients who are active and perspire profusely may require more frequent dressing changes. If any blood or moisture is noted at catheter insertion site, dressing must be changed.
7. The patient/caregiver is to be taught to check site for:
   - Excessive drainage or bleeding from catheter exit site.
   - Redness or swelling around the catheter exit site.
   - Pain, soreness, swelling or tenderness in the arm where the catheter is inserted.
   - Pain or discomfort during infusion of IV solution.
   - Chest pain or discomfort while catheter is in place.

8. Blood sampling can only be performed on adult patients with 3.0 French and larger size catheters and only with physician order.
9. Confirm physician’s order for blood work and to use the PICC for drawing the samples.
10. Difficulty in drawing blood from the catheter may be due to patient’s position, occlusion of the catheter by clots or a clamped catheter or pressure to withdraw blood is too great. Drawing blood for clotting studies from a heparinized line may falsely alter the results obtained.
11. Per Joint Commission recommendations all tubes and catheters should be labeled to prevent the possibility of tubing misconnections. Staff should emphasize to all patients/caregivers the importance of contacting a clinical staff member for assistance when there is an identified need to disconnect or reconnect devices.

A. MANAGEMENT OF COMPLICATIONS
1. A good physical assessment and patient education are the first line of defense in the management of post-insertion complication.
2. The following are the possible complications that may be encountered in the care of PICC lines and their management.
   a. Bleeding:
      - (1) A small amount of bleeding at the site of insertion is common. A sterile 2x2 gauze at the site of insertion is sufficient to manage this.
      - (2) Bleeding due to patient’s inherent coagulopathy problems may be managed by applying a mild pressure dressing aseptically for 5 minutes at the site of insertion.
   b. Sterile mechanical phlebitis has been found to occur:
      - (1) Within the first 48 to 72 hours after insertion.
      - (2) More in women than men.
      - (3) More in left-sided insertions.
      - (4) More when large gauge catheters are inserted.
   c. Grade 0-4 phlebitis:
      - (1) Apply moist, warm compress to upper arm for 20 minutes 4 times a day, elevate extremity and limit exercise of the extremity.
      - (2) If patient develops fever, increased pain, palpable cord or there is questionable discharge at site, notify physician for possible removal of PICC.
   d. Cellulitis:
      - (1) Cellulitis is best managed by prevention. A thorough cleansing of the site, adherence to sterile procedure and proper after-care of insertion site eliminates this complication.
(2) Cellulitis, when noted, may be successfully managed by a course of oral antibiotics such as dicloxicillin. Notify physician for appropriate medical therapy.

e. Catheter-related bloodstream infection (BSI) diagnosed according to the following Centers for Disease Control and Prevention (CDC) criteria: Catheter sepsis may only be diagnosed by establishing the following criteria:
   (1) The patient is septic.
   (2) Positive blood culture.
   (3) Catheter tip culture and for some organism.
   (4) No other potential source of organism.
   (5) Resolution of septic picture upon removal of catheter.
Therefore, management of catheter sepsis is in itself a diagnostic tool. Differential diagnosis, management and the decision to keep or remove the catheter are made by the physician.

f. Air embolism: Signs and symptoms of air embolism are chest pain, substernal churning sound on auscultation dyspnea, tachycardia, hypotension, nausea and anxiety. Immediately position patient on the left side with head down and call 911.

g. Pain during infusion: Stop Infusion. Assess patient for potential thrombophlebitis, infiltration, and sepsis. If symptoms persist, immobilize arm, discontinue infusion and notify physician.

h. Catheter tip migration may occur in patients who experience frequent vomiting, severe coughing and some physical activity.

i. Drainage from exit site: Assess drainage and rate of infusion. Culture could be indicated.

j. Thrombophlebitis, although rare, may occur. Immobilize arm, discontinue infusion and notify physician.

k. Broken catheter:
   (1) Review and follow manufacturer’s guidelines for repair, if applicable.
   (2) Teach patient how to apply tourniquet to upper arm to occlude venous system if catheter breaks off and how to secure remaining exterior catheter with tape.

B. FLUSHING/HEPARINIZATION

EQUIPMENT:

- Gloves
- Sterile drape
- Clamp
- 10 mL syringes
- Needle less adapter
- Tape
- Alcohol applicator/antimicrobial (wipe/swab/disk/ampule)
- Normal saline, if indicated

Heparin solution (100 units/mL or as prescribed)
- Puncture-proof sharps container
- Biohazard trash bag

PROCEDURE:

1. Adhere to Standard Precautions.
2. Explain the procedure and purpose to the patient/caregiver.
3. Assemble the equipment on a clean surface with sterile drape close to the patient.
4. Place patient in comfortable reclining position, ensuring that the site is accessible.
5. Ensure adequate lighting.
7. If medication administered, follow SASH method (see Consideration No. 4).
8. If medication not administered, insert heparin filled syringe with needle less adapter into injection port. Inject heparin solution using steady pressure. Before syringe is completely empty, clamp line and apply pressure on plunger while removing syringe, unless cap has positive pressure valve.
9. Discard expended supplies in appropriate containers.

AFTER CARE:

1. Document in patient’s record:
   a. Date, time and procedure performed.
   b. Amount of saline and heparin flush, including strength of heparin solution.
   c. Medication administered, dosage and time.
   d. Appearance of venous access site.
   e. Patient’s response to procedure.
   f. Instructions given to patient/caregiver.
   g. Patient’s response to teaching.

C. INTERMITTENT INJECTION PORT CHANGE

If the extension tubing is attached at the time of catheter insertion, it is a permanent part of the catheter and is changed ONLY if cracked, leaking or inadvertently disconnected. The injection port is then changed every 7 days and PRN.

EQUIPMENT:

- Gloves
- Sterile drape
- Injection port
- Clamp
- Alcohol applicator/antimicrobial (wipe/swab/disk/ampule)
- Tape
- Heparin solution (100 units/mL or as prescribed)
- 10 mL syringe with needle less adapter
- Puncture-proof container
Biohazard trash bag

PROCEDURE:
1. Adhere to Standard Precautions.
2. Explain the procedure and purpose to the patient/caregiver.
3. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
4. Ensure adequate lighting.
5. Assemble the equipment on a clean surface close to the patient.
6. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
7. Ensure adequate lighting.
8. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
9. Assemble the equipment on a clean surface close to the patient.
10. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
11. Ensure adequate lighting.
12. Assemble the equipment on a clean surface close to the patient.
13. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
14. Ensure adequate lighting.
15. Assemble the equipment on a clean surface close to the patient.
16. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
17. Ensure adequate lighting.
18. Assemble the equipment on a clean surface close to the patient.
19. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
20. Ensure adequate lighting.

AFTER CARE:
1. Document in patient’s record:
   a. Date, time and procedure performed.
   b. Amount of heparin solution flush, including strength of heparin solution.
   c. Appearance of venous access site involving catheter/skin junction.
   d. Patient’s response to procedure.
   e. Instructions given to patient/caregiver.
   f. Patient’s response to teaching.

D. DRESSING CHANGE

EQUIPMENT:
Sterile 5 x 7 cm transparent semi-permeable adhesive dressing (Opsite, Tegaderm)
Alcohol applicator (wipe/swab/disk/ampule)
Antimicrobial applicator (wipe/swab/disk/ampule) or ChloraPrep®

PROCEDURE:
1. Adhere to Standard Precautions.
2. Explain the procedure and purpose to the patient/caregiver.
3. Assemble the equipment on a clean surface close to the patient.
4. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
5. Ensure adequate lighting.
6. Assemble the equipment on a clean surface close to the patient.
7. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
8. Ensure adequate lighting.
9. Assemble the equipment on a clean surface close to the patient.
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15. Assemble the equipment on a clean surface close to the patient.
16. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
17. Ensure adequate lighting.
18. Assemble the equipment on a clean surface close to the patient.
19. Place patient in comfortable reclining position, ensuring that site is accessible and below the level of the heart.
20. Ensure adequate lighting.

AFTER CARE:
1. Document in patient’s record:
   a. Date, time and procedure performed.
   b. Amount of heparin solution flush, including strength of heparin solution.
   c. Appearance of venous access site involving catheter/skin junction.
   d. Patient’s response to procedure.
   e. Instructions given to patient/caregiver.
   f. Patient’s response to teaching.
E. DRAWING BLOOD

EQUIPMENT:

- Gloves
- Alcohol applicator (wipe/swab/disk/ampule)
- 10-20 mL normal saline
- Syringes for drawing blood samples (5-10 mL)
- Evacuated tubes for lab assay
- 10 mL syringes with needle less adapters
- Heparin solution (100 units/mL or as prescribed)
- Injection port
- Protective eye wear (optional)
- Disposable apron (optional)
- Puncture-proof container
- Biohazard trash bag
- Sterile drape

PROCEDURE:

1. Adhere to Standard Precautions.
2. Explain the procedure and purpose to the patient/caregiver.
3. Assemble the equipment on a clean surface with sterile drape close to the patient.
4. Place patient in comfortable reclining position, ensuring that site is accessible.
5. Ensure adequate lighting.
6. Use vasodilation techniques, e.g., warm fluids orally or a warm pack to the extremity, prior to attempting blood sampling.
7. Clean extension set and injection port at junction with alcohol applicator using friction. Allow to air dry.
8. Insert needle less system with normal saline-filled syringe into injection point.
9. Aspirate first to determine PICC patency, then flush with 5-10 mL of normal saline before drawing any blood.
10. Withdraw maximum of 3 mL blood/normal saline mixture (the internal lumen of a 20-gauge PICC catheter is 0.3 mL). Discard syringe with blood into puncture-proof container.
11. Obtain the blood sample using a 5-10 mL syringe. [Note: Always use slow, gentle pressure when withdrawing a blood sample to prevent collapsing of the catheter.]
12. If unable to withdraw blood, try the following:
   a. Rotate, flex or change arm position to move the catheter tip into a free-from-obstruction position.
   b. Aspirate, then flush catheter again with normal saline.
   c. Reposition patient and reattempt aspiration and flush procedures.
13. Insert needle less system with 10 mL normal saline-filled syringe into injection port and flush PICC vigorously to remove all blood. Re-clamp. Attach syringe with heparin solution, unclamp and flush with heparin solution. Clamp. Remove syringe. Attach new pre-filled injection port to PICC adaptor/hub and flush. (See Infusion Therapy - Central Venous Catheter: Intermittent Injection Port Change.)
14. General order of sample collections:
   a. First: Blood culture tubes or vials.
   b. Second: Coagulation tube (e.g., blue-top tubes).
   c. Third: Serum tube with or without clot activator or gel (e.g., red, gold or speckle-top tubes).
   d. Fourth: Heparin tubes (e.g., green-top tubes).
   e. Fifth: EDTA tubes (e.g., lavender-top tubes).
   f. Sixth (Last): Oxalate/fluoride tubes (e.g., gray-top tubes).
15. Discard contaminated supplies and equipment in appropriate containers.

AFTER CARE:

1. Document in patient’s record:
   a. Date, time and procedure performed.
   b. Blood samples drawn and volume of blood, identity and location of laboratory where specimens taken.
   c. Amount of normal saline and heparin flush, including strength of heparin.
   d. Patient’s response to procedure.
   e. Instructions given to patient/caregiver.
   f. Patient’s response to teaching.