Infusion Therapy – Midline Catheter: Maintenance and Management of Potential Complications  SECTION: 25.27
Strength of Evidence Level: 3 __RN__LPN/LVN__HHA

PURPOSE:
To maintain a patent IV access for continuous or intermittent drug, fluid infusion or blood withdrawal via a midline catheter. Prevention, early detection and management of midline catheter related complications.

CONSIDERATIONS:
1. The recommended maximum dwell time for midline catheters is 2 to 4 weeks.
2. Intermittently accessed midline catheters will be 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. Unless otherwise ordered by a physician, 3-5 mL of normal saline will be used.
   S – Saline.
   A – Administer drug/solution.
   S – Saline.
   H – Heparin.
5. Dressing should be changed at least every 5 to 7 days or PRN when using a transparent permeable adhesive dressing. Patients who are active and perspire profusely may require more frequent dressing changes. If any blood is noted under dressing at catheter exit site, dressing must be changed.
6. The application of a polymer skin coating (skin preparation swabs) increases both the patient's comfort and dressing life.
7. The patient/caregiver is to be taught to check site for:
   a. Excessive drainage or bleeding from catheter exit site.
   b. Redness or swelling around the catheter exit site.
   c. Pain, soreness, swelling or tenderness on the arm where catheter is inserted.
   d. Pain or discomfort during infusion of IV solution.
   e. Chest pain or discomfort while catheter is in place.
   [Note: No blood pressure cuff or tourniquet should be used on accessed arm.]
8. The midline catheter is made of extremely soft material and is not recommended for routine blood draws. However, it is possible to draw blood samples without collapsing the catheter if slow, gentle pressure is used.
9. Confirm physician's order for blood work and to use the midline catheter for drawing the samples.
10. Difficulty in drawing blood from the midline catheter may be due to patient's position, collapsing of the catheter by clots, a clamped catheter, or pressure to withdraw blood is too great.
11. Drawing blood for clotting studies from a heparinized line may falsely alter the results obtained.

PROCEDURE:

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 midline catheters and their management:
   a. Bleeding due to patient's inherent coagulopathy problems may be managed by mild pressure to the dressing 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 I-III phlebitis:
      (1) Apply moist, warm compresses to upper arm for 20 minutes 4 times a day, elevation of extremity and mild exercise.
      (2) If patient develops fever, increased pain, or there is questionable discharge at site, notify physician for possible removal of line.
   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, is successfully managed by a course of oral antibiotics such as dicloxicillin. Notify physician for appropriate medical therapy.
   e. Catheter sepsis may only be diagnosed by establishing the following criteria:
      (1) The patient is septic.
      (2) Blood culture for specific organism.
      (3) Catheter tip culture for same organism.
      (4) No other potential source of organism.
      (5) Resolution of septic picture upon removal of catheter.
      [Note: 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, sub-ternal pain, dyspnea, tachycardia, hypotension and nausea complaints. Immediately position patient to the left side, head down, and call 911.
g. Pain during infusion: Infuse solution at a slower rate. Applying warm compresses to upper arm during infusion may help decrease pain. Assess patient for potential thrombophlebitis, infiltration and sepsis. If symptoms persist, immobilize arm, discontinue infusion and notify physician.

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

i. Thrombophlebitis: Immobilize arm, discontinue infusion and notify physician.

B. FLUSHING/HEPARINIZATION

EQUIPMENT:

- Gloves
- Alcohol applicator (wipe/swab/disk/ampule)
- 3 mL syringes with needles or needle less adaptors
- Heparin solution (100 units/mL or as prescribed)
- Normal saline, if indicated
- Tape
- Puncture-proof container
- Impervious 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 close to the patient.
4. Place patient in comfortable position, making sure that site is accessible.
5. Ensure adequate lighting.
6. Prepare syringes with flushing solution, normal saline and heparin.
7. Clean injection port with alcohol applicator, using friction. Allow to air dry.
8. If medication administered, follow SASH method (see Consideration Step 4).
9. If medication not administered, insert heparin-filled syringe with 25-gauge needle or needle less adaptor into injection port unless cap has a positive pressure valve. Inject heparin solution into injection port using steady pressure. Before syringe is completely empty, clamp line and apply pressure on plunger while withdrawing syringe and needle or needle less adaptor.
10. Discard soiled supplies in appropriate containers.

AFTER CARE:

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

C. INTERMITTENT INJECTION PORT CHANGE

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

EQUIPMENT:

- Gloves
- Alcohol applicator (wipe/swab/disk/ampule)
- Injection port
- Heparin solution (100 units/mL or as prescribed)
- 10 mL syringe with 25-gauge needle or needle less adaptor
- Clamp
- Tape
- Puncture-proof container
- Impervious trash bag

PROCEDURE:

1. Adhere to Standard Precautions.
2. Explain the procedure and purpose to patient/caregiver.
3. Assemble equipment on clean surface close to patient.
4. Place patient in comfortable position, making sure that site is accessible and below the level of the heart.
5. Ensure adequate lighting.
6. Draw up heparin solution, 3-5 mL in a 10 mL syringe.
7. Open protective packaging of new injection port.
8. Insert heparin-filled syringe with 25-gauge needle or needle less adaptor into injection port.
9. Slowly inject flush to fill dead space of injection port, and then remove syringe and needle or needle less adaptor.
10. Clean extension set and injection port at junction with alcohol applicator, using friction.
11. Wrap alcohol wipe around junction until injection port is removed.
12. Clamp catheter.
13. Remove old injection port.
14. Remove protective cover from new injection port.
15. Attach new pre-filled injection port, twisting firmly to secure.
16. Unclamp catheter.
17. Tape extension set and injection port junction.
18. Insert heparin-filled syringe with 25-gauge needle or needle less adaptor into injection port unless cap/device has a positive pressure valve. Inject 3 mL-heparin solution, using steady pressure.
Remove syringe and needle or needle less adaptor, exerting positive pressure on syringe as it is removed.
19. Clamp catheter or reconnect to infusion, as needed.
20. Discard soiled supplies in appropriate containers.

AFTER CARE:
1. Document in patient's record:
   a. Date, time and procedure performed.
   b. Amount of heparin flush and strength.
   c. Appearance of venous access site.
   d. Patient's response to procedure.
   e. Instructions given to patient/caregiver.

D. SITE CARE, DRESSING CHANGE

EQUIPMENT:
Gloves, sterile and non-sterile
Alcohol applicator (wipe/swab/disk/ampule)
Antimicrobial applicator (wipe/swab/disk/ampule)
5 cm x 7 cm transparent permeable adhesive dressing
Steri-Strips
Skin prep swab (optional)
Mask (optional)
Impervious trash bag

PROCEDURE:
1. Adhere to Standard Precautions.
2. Explain the procedure and purpose to the patient/caregiver. Ask if patient is allergic to any creams, ointments or solutions that are put on the skin, i.e., iodine.
3. Assemble the equipment on a clean surface close to the patient. Create a sterile field.
4. Place patient in comfortable position, making sure that site is accessible.
5. Ensure adequate lighting.
6. Don non-sterile gloves and mask, if indicated.
7. Slowly loosen transparent dressing at the distal end. Support and anchor catheter tube with the other hand during this process. Peel dressing toward the exit site and parallel to the skin.
8. Inspect site for signs and symptoms of infection. If present, notify physician.
9. Remove gloves, wash hands and don sterile gloves.
10. Clean exit site with 3 alcohol applicators in a circular fashion moving from the exit site out at least 2 to 3 inches in diameter. Allow to air dry. DO NOT blot.
11. Repeat using 3 antimicrobial applicators. Allow to air dry. DO NOT blot.
12. Anchor the catheter to the skin using steri-strips or tape.
13. Apply transparent permeable adhesive dressing. Dressing must cover entire exit site, catheter and extension tubing connector leaving only the injection port accessible for therapy and procedures.
14. Discard soiled supplies in appropriate containers.

AFTER CARE:
1. Document in patient's record:
   a. Procedure and observations.
   b. Appearance of venous access site.
   c. Patient's response to procedure.
   d. Instructions given to patient/caregiver.

E. DRAWING BLOOD

EQUIPMENT:
Gloves
Alcohol applicator (wipe/swab/disk/ampule)
10 – 20 mL normal saline
Syringes for drawing blood samples
Lab tubes
Heparin solution (100 units/mL or as prescribed)
Syringes with needles or needle less adaptors
Injection port
Protective eye wear (optional)
Disposable apron (optional)
Puncture-proof container
Impervious 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 close to the patient.
4. Place patient in comfortable position, making sure that site is accessible.
5. Ensure adequate lighting.
6. Use vasodilation techniques (e.g., warm fluids orally; a warm pack to the site) prior to attempting blood sampling.
8. Clamp catheter and remove old injection port.
9. Connect a luer-lock syringe to hub of catheter to perform blood sampling procedure rather than using a needle inserted into the injection port. Unclamp catheter.
10. Flush with 5-10 mL of normal saline before drawing any blood.
11. Withdraw maximum of 3 mL blood/normal saline mixture. Discard syringe with blood into puncture-proof container.
12. Obtain the blood sample using a 3-5 mL syringe. [NOTE: Always use slow, gentle pressure when withdrawing a blood sample, to prevent collapsing the catheter.]
13. 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. Flush catheter again with normal saline.

14. Attach syringe with 10 mL of normal saline to line, unclamp and flush line vigorously to remove all blood from line. Reclamp line.

15. Attach new pre-filled injection port to line and flush. (See Infusion Therapy- Intermittent Injection Port Change.)

16. 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).

17. Discard soiled supplies in appropriate containers.

AFTER CARE:

1. Document in patient's record:
   a. Date, time and procedure performed.
   b. Blood samples drawn, 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. Communication with physician.