

CONSIDERATIONS:

1. This midline procedure includes procedural steps for:
 - a. Catheter Insertion
 - b. Flushing
 - c. Site care and dressing change
 - d. Cap change
 - e. Blood Draw
 - f. Management of complications
2. Midline catheters are the preferred vascular access device when:
 - a. IV therapy is anticipated to be greater than 1 week but less than 4 weeks
 - b. Anticipated infusion therapy is not:
 - i. A vesicant
 - ii. Total parental nutrition (TPN)
 - iii. An infusion with a pH less than 5 or greater than 9
 - iv. An infusion with an osmolality greater than 600 mOsm/L
 - c. Line will not be needed for blood draws
3. Midline catheters are appropriate for administering:
 - a. Hydration and IV solutions
 - b. Some antibiotics
 - c. Pain medications
4. Midline catheter characteristics:
 - a. Classified as peripheral lines
 - b. Inserted just above or below antecubital fossa
 - c. Length is 3 to 8 inches
 - d. Placed in the basilica (preferred), cephalic or brachial vein
 - e. Distal tip extends below the axillary line
 - f. Available with single and double lumens
 - g. Have a usual dwell time of 2 to 4 weeks, but can be extended beyond
5. Insertion requires training, knowledge and skills beyond those of standard infusion therapy. The nurse who inserts a midline catheter should:
 - a. Be skilled in intravenous therapy
 - b. Successfully complete an approved midline insertion class
 - c. Demonstrate knowledge and skill in the procedure through rigorous competency assessment
 - d. Read and follow the manufacturer's instructions for the specific midline catheter. Instructions may vary from the procedure described here
6. Insertion of a midline catheter requires maximum sterile barrier precautions and rigorous aseptic technique:
 - a. Sterile field, sterile gloves, and masking of both clinician and patient
 - b. Site preparation using a "surgical scrub" approach with required wet and drying times for solution used (2 to 5 minutes depending on solution). Options for solutions include:
 - i. Chlorhexidine (preferred)
 - ii. Alcohol 70%
 - iii. Tincture of iodine (2%)
7. If a saline-flushed extension tube is prepared and attached under sterile conditions when the midline is inserted, it is considered part of the catheter, not a part of tubing, and does not need to follow tubing change frequency.
8. Maintenance care of midline catheter:
 - a. Flushing:
 - i. Pre and post medications
 - ii. At least once a day
 - b. Site care and dressing change:
 - i. Gauze dressing: Every 2 days
 - ii. Transparent semipermeable membrane (TSM): Every 7 days and PRN
 - c. Cap change every seven day
9. Flushing Recommendations:
 - a. Flushing solutions are preservative-free normal saline and heparin 10 units/mL
 - b. Flushing may be with saline alone, or saline and heparin solution depending on manufacturer's instructions
 - c. Flushing may require "positive fluid displacement" (flushing while locking) depending on manufacturer's instructions
 - d. When medications are administered, a saline flush must be administered immediately pre- and post-medication, to prevent drug incompatibility with heparin
 - e. Usual flush orders:
 - i. Normal saline: 5mL – 10mL
 - ii. Heparin 10 units/mL: 3mL – 5 mL
 - iii. Prefilled syringes reduce contamination risk
 - f. Procedure for SASH:
S – Saline
A – Administer drug/solution
S – Saline
H – Heparin
 - g. Aspirate to confirm blood return prior to first saline flush:
10. Site Care Frequency:
 - a. Perform at routine intervals:
 - i. 2 days for gauze dressing
 - ii. 7 days and PRN for transparent semipermeable membrane (TSM) dressing
 - b. Perform whenever the dressing becomes compromised (moisture, drainage, blood)

11. Site care consists of:
 - a. Removing old dressing
 - b. Thoroughly assessing site for redness, puffiness, drainage, etc.
 - c. Cleansing the site with chlorhexidine or alcohol and betadine
 - d. Applying a polymer skin coating with skin preparation swabs (Request orders as extends life of dressing)
 - e. Securing the line
 - f. Applying a new gauze or TSM dressing
 - g. Initialing the dressing with date/time/initials
12. Gauze dressing or TSM dressing:
 - a. Gauze dressings preferred for:
 - i. Bleeding or oozing anticipated at site
 - ii. Diaphoretic or very moist skin
 - b. TSM dressings preferred for:
 - i. Easy visualization of site
 - ii. Decreased need for “opening” dressing
13. Removal of midline catheter:
 - a. Decision to remove based on:
 - i. Length of therapy
 - ii. Condition of site
 - iii. Condition of tissue at tip of catheter along path
 - b. When removing:
 - i. Apply digital pressure until hemostasis
 - ii. Apply petroleum based ointment and sterile dressing
14. Blood drawing from catheter:
 - a. Is not recommended except at time of insertion
15. Complications:
 - a. Most frequent midline complication is sterile mechanical phlebitis:
 - i. Usually occurs in first 48 to 72 hours after insertion
 - ii. If Stage I-III phlebitis, do not remove catheter. Treat with:
 1. Moist, warm compresses to upper arm for 20 minutes 4 times a day
 2. Elevation of extremity
 - b. Remove catheter if patient develops fever, increased pain, or there is questionable discharge at site
16. Patient Education: Teach patient/caregiver to:
 - a. Check site for excessive drainage, bleeding, redness, swelling at exit site
 - b. Report pain, soreness, swelling or tenderness of the arm or chest discomfort
 - c. Report any pain or discomfort during infusion of IV solution
 - d. Never allow blood pressures or venipuncture of affected arm

- e. Always use meticulous aseptic technique when administering medications or performing flushes
17. All tubes and catheters must be labeled to prevent the possibility of tubing misconnections. Staff should emphasize to all patients the importance of contacting a clinical staff member for assistance when there is an identified need to disconnect or reconnect devices.

EQUIPMENT:

Venous access device (appropriate gauge for specific therapy)

Towel (for under patient's arm)

Tourniquet

Sharps container

Masks (2; one for patient)

PPE:

Protective eye wear (recommended)

Disposable gown/apron (recommended)

Insertion kit containing:

Sterile drapes

Sterile gloves (2 pair)

Alcohol applicator (wipe/swab/disk/ampule)

Antimicrobial applicator (wipe/swab/disk/ampule)

Sterile tape, Steri-Strips or Securement Device

Transparent permanent adhesive dressing

Flush solutions as ordered:

Syringe with 3 – 5 mL saline

Heparin solution (10 units/mL)

Towel roll, if applicable

Puncture-proof container

Impervious trash bag

PROCEDURE:

1. Check order for type of catheter and for flush solutions.
2. Read the insertion instructions from the manufacturer that comes with the catheter, as procedures can vary.
3. Use two patient identifiers
4. Explain the procedure and purpose to the patient/caregiver.
5. Adhering to Standard Precautions, position patient in a place where:
 - a. Patient can lie down comfortably
 - b. Arm is accessible and fully extended and supported on a towel or sheet
 - c. Lighting is good
 - d. Towels can be placed under arm, optional
6. Assess veins in the selected arm:
 - a. Apply tourniquet visualizing veins
 - b. If site is hairy, clip hair
7. Assemble the equipment on a clean surface close to the patient:
 - a. Put sharps container “at hand” and open it

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- b. Prepare to create a sterile field
8. Prepare sterile field and don PPE:
 - a. Put on a mask, protective eye wear and apron/gown
 - b. Assist patient to put on a mask
 - c. Wash hands
 - d. Open catheter package and drop on sterile field
 - e. Open other supplies and drop on sterile field
9. Cleanse the site:
 - a. Don sterile gloves
 - b. Clean skin:
 - i. If using chlorhexidine, scrub back and forth, 30 seconds for each swab. Allow to air dry
 - ii. If using alcohol and betadine, wipe using a circular fashion, moving from the exit site out at least 4 inches in diameter. Allow to air dry. Do not blot.
 - c. Repeat procedure using antimicrobial applicator three times
 - d. Remove gloves
10. Perform venipuncture:
 - a. Apply tourniquet
 - b. Don the second pair of sterile gloves
 - c. Drape the arm so that the entire length of the catheter will fall on the drape
 - d. Remove the needle guard on midline catheter
 - e. Check the position of the bevel (bevel facing upward)
 - f. Perform venipuncture with needle introducer and observe flashback of blood through the tubing
11. Advance the catheter:
 - a. Carefully advance the needle tip approximately 1/8 - 1/4 inches further
 - b. Release the tourniquet by:
 - i. Using a sterile 4 x 4 or
 - ii. Pulling through the drape or
 - iii. Asking patient to release the tourniquet from under the drape
 - c. While holding the needle/introducer in place, advance the catheter through the introducer into the patient's vein
 - d. Advance the catheter until about 2 inches are remaining
12. Remove introducer:
 - a. Place two fingers 2 inches proximal to the tip of the needle/introducer
 - b. Remove needle/introducer by pulling down in a straight line distally
 - c. Place gauze over the needle (to prevent splash)
 - d. Peel the introducer apart
 - e. Discard introducer into sharps container
13. Completing procedure:
 - a. Advance the remaining 2 inches into the vein
 - b. Remove the guide wire (if used in insertion)

- c. Attach a saline syringe to the line
- d. Aspirate to check for blood return
- e. Flush the catheter with 5 – 10mL of saline
- f. Disconnect the syringe
- g. Connect prefilled needleless cap to line
14. Secure the catheter with the sterile tape or Steri-strips or securement device. Tape or steri-strip should not touch midline catheter.
15. Apply transparent semi-permeable adhesive dressing.
16. Discard soiled supplies in appropriate containers.

AFTER CARE:

1. Document in patient record:
 - a. Procedure and observations
 - b. Time and date of procedure
 - c. Catheter size, length and brand
 - d. Location of insertion site; vein site
 - e. Site appearance and surrounding skin condition
 - f. Catheter status after insertion: blood return and ease of flushing
 - g. Upper extremity circumference
 - h. Patient's response to procedure
 - i. Instructions given to patient/caregiver

FLUSHING/HEPARINIZATION EQUIPMENT:

Gloves

Alcohol applicator (wipe/ swab/ disk/ ampule)

Syringe of 10mL Normal Saline

Syringe of 3-5 mL of Heparin 10 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 by removing air from saline and heparin.
7. Clean injection port with alcohol applicator, using friction for a least 15 seconds. Allow to air dry.
8. If medication administered, follow SASH method.
9. If medication not administered, insert heparin-filled syringe into injection port.
10. Inject heparin solution into injection port using steady pressure.

11. If port does not have a positive pressure adapter, before syringe is completely empty, clamp line and apply pressure on plunger while withdrawing syringe
12. 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

SITE CARE, DRESSING CHANGE EQUIPMENT:

Gloves, sterile and non-sterile
Alcohol applicator (wipe/ swab/ disk/ ampule)
Antimicrobial applicator (wipe/ swab/ disk/ ampule)
5 x 7 cm transparent, semipermeable membrane dressing
Steri-Strips or Securement Device
Skin prep swab, optional
Mask
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. Prepare for procedure:
 - a. Assemble the equipment on a clean surface, close to the patient
 - b. Place patient in comfortable position, making sure that site is accessible
 - c. Ensure adequate lighting
4. Remove current dressing and assess site:
 - a. Assist patient apply mask or have them turn away
 - b. Don non-sterile gloves and mask
 - c. Support and anchor catheter tube with non-dominant hand
 - d. Slowly loosen transparent dressing at the distal end
 - e. Peel dressing toward the exit site and parallel to the skin
 - f. Inspect site for signs and symptoms of infection. If present, notify physician
 - g. Remove gloves, wash hands
5. Create a sterile field and cleanse site:
 - a. Don sterile gloves
 - b. Prepare sterile field and prepare supplies

- c. Clean exit site as per cleansing solution's directions:
 - i. If using chlorhexidine, scrub back and forth, 30 seconds for each swab. Allow to air dry
 - ii. If using alcohol, wipe using a circular fashion, moving from the exit site out at least 4 inches in diameter. Allow to air dry. Do not blot. Follow with betadine swabs. Allow to dry 2 minutes.
6. Apply new dressing:
 - a. Anchor the catheter to the skin using Steri-strips, sterile tape or securement device.
 - b. 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
 - c. Put date, time, and initials on dressing
7. Discard soiled supplies in appropriate containers.

AFTER CARE:

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

INTERMITTENT INJECTION PORT CHANGE EQUIPMENT:

Gloves
Alcohol applicator (wipe/ swab/ disk/ ampule)
Injection port
Prefilled Heparin syringe 5cc (10 units/mL or as prescribed)
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. Remove air from prefilled Heparin syringe
7. Open protective packaging of new injection port.
8. Insert heparin-filled syringe into injection port.
9. Slowly inject flush to fill dead space of injection port and extension if used.
10. Wrap alcohol wipe around junction until injection port is removed:

- a. Remove old injection port
 - b. Clean end of catheter
 - c. Remove protective cover from new injection port
 - d. Attach new pre-filled injection port, twisting firmly to secure
 - e. Tape extension set and injection port junction
11. Inject 3 mL-heparin solution, using steady pressure.
 12. If the port has a positive pressure valve, exert positive pressure on syringe as while removing and clamping.
 13. Remove syringe.
 14. Discard soiled supplies in appropriate containers.

AFTER CARE:

1. Document in patient 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

Management of Complications:

- a. A good physical assessment *and patient education are the first line of defense in the management of post-insertion complications.*
- b. The following are the possible complications that may be encountered in the care of midline catheters and their management:
 - i. 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
 - ii. 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
 - iii. 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 dicloxacillin. Notify physician for appropriate medical therapy

- iv. Catheter sepsis can occur and is diagnosed by physician using following criteria:
 1. Patient is septic
 2. Blood culture positive for specific organism
 3. Catheter tip culture positive for same organism
 4. No other potential source of organism is causing sepsis
 5. Resolution of septic picture upon removal of catheter
- v. Air embolism: Signs and symptoms of air embolism are chest pain, sub-sternal pain, dyspnea, tachycardia, hypotension and nausea complaints. Immediately position patient to the left side, head down, and call 911
- vi. 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
- vii. Drainage from exit site: Assess drainage and rate of infusion. Culture could be indicated. Notify physician for possible removal of line.
- viii. Thrombophlebitis: Immobilize arm, discontinue infusion and notify physician

AFTER CARE:

1. Document in patient medical record:
 - a. Presence of problem, providing information about the problem's location, quality, quantity, onset, duration, frequency, aggravating and mitigating factors (as applicable) and nursing interventions provided
 - b. Physical assessment findings, including vital signs, condition of skin at site, along path of catheter, and at distal tip
 - c. Patient's level of pain/discomfort with the problem
 - d. Teaching and advice provided to patient/caregiver
 - e. Communicate with physician
2. Communicate with the physician about abnormal assessment findings, especially signs of infection/inflammation.

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