# CENTRAL LINE CATHETER CARE AND MAINTENANCE (cen01)

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## RELATED PROCEDURES

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PURPOSE: To provide insertion, access, care and maintenance and removal strategies.

To reduce the possibility of introducing microorganisms upon insertion or during routine maintenance through aseptic practices.

DEFINITIONS:

Central Line: A central line is a vascular access device in which the tip of the catheter will optimally rest in the superior vena cava at the junction of the right atrium. Access points may include the internal jugular, external jugular, subclavian, or the femoral vein.

Central Line Insertion Bundle - is a group of individual evidence-based interventions that when implemented together result in better outcomes. Includes head to toe draping, CHG skin preparation and others.

Single Skin Prep: The site will be thoroughly cleansed with 3 ml Chlorhexidine applicator (2% Chlorhexidine and 70% Isopropyl alcohol). Use repeated back-and-forth strokes of the applicator for approximately 30 seconds or per package instructions over the immediate insertion site and then work outward with the same back-and-forth motion covering about a five inch radius from the puncture site. (Do not take the applicator back to the insertion site). Completely wet the treatment area with antiseptic. Allow the area to air dry. Do not blot or wipe away.

Double Skin Prep: (To be used if patient is allergic to Chlorhexidine only) The site will be thoroughly cleansed with 70% Isopropyl alcohol, followed by application of povidone-iodine solution. Allow the area to air dry thoroughly for a minimum of two minutes. DO NOT blot.

Chlorhexidine (CHG) Impregnated Patch: A patch impregnated with Chlorhexidine that must completely encircle the catheter to be effective. The patch is placed arrow side up. The patch is to be applied upon insertion of all central lines. Exception if the patient has an allergy.

Curos Cap: A device used to protect and disinfect all needleless connectors.

Final Check – process for verification of correct specimen labeling. Final check is performed at bedside by staff that collected the specimen immediately upon obtaining specimens. Perform the Final check verification for EACH specimen collected by reading out loud the last 3 digits of the patient’s visit number on the specimen label and then reading out loud the last 3 digits of the patient visit number on the patient identification band.
PATIENT EDUCATION: Informed consent is to be obtained by the physician to include the procedure, risks, benefits and alternatives. After informed consent is given, the nurse MUST obtain a signed consent. The patient or their family/caregiver should be given the patient information sheet (located in the Bundle pack).

KNOWLEDGE BASE: The central venous catheter is designed and recommended primarily for: CVP monitoring, cardiac profile, dialysis hemodynamic profile, administration of viscous or high-volume fluids, medications with extremes in pH, blood or blood products, TPN, long term antibiotics and induced hyperthermia.

If a patient arrives with an existing central line, validate patency by aspirating blood and assure ease of flushing. Request a chest x-ray order to confirm proper location. Functional Central lines of recurring patients are considered “in use” and do not require a chest film to confirm placement.

The use of insertion sites in which the skin integrity is compromised is prohibited.

SITE ASSESSMENT: The need for the central line to remain in place is to be assessed every shift. If the line is not needed, it should be removed as soon as possible.

A complete assessment, starting at the infusion bag and terminating where the tip rests in the body, is to be conducted and documented at least once per shift and PRN. Assessment will include vascular equipment in use and site functionality with palpation of the site and aspirate for a blood return and then flush with 10 ml normal saline (each lumen).

Brisk blood return should be validated before infusion of any fluid. Notify the PICC Team or Intervention RN for additional assessment of the device if needed. Refer to Management of Vascular Access Complications cen05 as needed.

Nursing will utilize the Central Line Checklist available in the EMR and will assist with and observe procedures to ensure sterile field was maintained. In an emergency, if paper checklist is used, the
PROCEDURE:

Central lines placed without full bundle (such as in an emergency) are to be removed within 48 hours and the need for and a new site should be reassessed before a new site is inserted.

**Equipment For insertion**, obtain the following:
1. Obtain and place order for “Central Line Insertion” Obtain Central Line Insertion Cart from CS (8AM-8PM) or the . New hours may be 24 hours
2. If hair removal is necessary, clipper handle and blade must be obtained.

**INSERTION OF VENOUS CENTRAL LINE**

1. Perform hand hygiene.
2. Perform a “time-out” per hospital policy (01.PAT.09) to verify correct patient, procedure and site.
3. The patient may be clipped for removal of hair if necessary. Straight razors are not to be used.
4. Position flat in bed or placed in Trendelenburg position with rolled towel or bath blanket beneath the cervical vertebrae.
5. Foam hands and open Bundle pack on the cart surface. Discard the outer wrap. Provide the Inserter with a hat and mask with shield and don extra hat and mask. Patient Information sheet is given to the patient and their family as appropriate. If additional staff is in the room, they need to wear a mask and hat. It is preferable that the door to the room be closed so unmasked staff won’t enter--if any visitors at bedside they must be masked if they are within 3 feet of the patient. The assistant will follow and complete the Checklist and ensure the Checklist requirements are met as the procedure unfolds.
6. Open the Central Line Kit on a separate surface cleaned with germicidal surface wipes first, and remove the Chlorhexidine swabstick. The physician (or PICC RN in the event of a PICC or Midline) (or the assistant) will prep site. For patients allergic to chlorhexidine, use double skin prep.
   **NOTE:** The prep is done before the inserter gowns.
7. The gown/drape wrap is opened and the inserter performs hand hygiene immediately before gowns.
8. Inserter then dons sterile gown and sterile gloves. Assistant ties gown and assists with the turning of the gown.. If contamination occurs during this procedure, start over with new gown and/or gloves.
9. Inserter and assistant place a sterile body drape over the patient.
10. The physician [or PICC RN] may elect to inject Xylocaine into
the subcutaneous tissue surrounding the site of cannulation.

11. While the needle and venous catheter are being inserted by the physician, the nurse will observe the patient for changes in respiration, pulse, color, and pain and ensure the sterile field is being maintained. The drape may be lifted off of the patients face and held up, but must not be folded back.

12. After insertion is complete, apply needleless connector, aspirate for blood return, and flush each port with 10 mL’s normal saline, maintaining aseptic technique. Central line may not be used until radiology verification has been obtained (unless approved and ordered by the MD), or unless catheter has been placed at femoral site. Central lines placed in Perioperative services will be verified in PACU.

13. The physician will secure the catheter in place leaving enough distance on the line to place the Chlorhexidine impregnated patch fully around the line (contraindicated if allergic to Chlorhexidine).

14. Once the procedure is completed, the physician will tear away the drape to allow for application of the dressing.

15. The dressing may be applied by either the inserter or the nurse, but must be done with sterile gloves and as soon as possible. The site should be clean and completely dry before the dressing is applied.

16. Hand hygiene should be performed after glove removal by both the inserter and the assistant.

17. Date the dressing.

18. Apply Curos Cap to needleless connector.

19. Return the patient to a comfortable position.

20. Take the patient’s vital signs.

21. Obtain a physician’s order for “STAT” portable chest x-ray to confirm the proper placement of the catheter tip. Enter the purpose of the x-ray in the comment field of the order entry format. The physician must be notified immediately of incorrect catheter placement. Request “wet reading” to be called to the unit.

22. Once the catheter placement is verified by x-ray, the IV solution will be regulated as ordered by the physician.

23. Observe, document, and notify the physician of any untoward effect, such as: respiratory distress; e.g., tachypnea, dyspnea, cyanosis, absence of breath sounds, and occurrence of subcutaneous emphysema.

24. Document in the EMR. A nurse flush order for normal saline and heparin should be entered.

**EQUIPMENT For Dressing Change**
- Obtain the following:
  1. Sterile central line dressing kit
  2. Extra masks as needed for patient and visitors
  3. Stabilization device
  4. Non-sterile gloves
  5. Germicidal surface wipes
  6. Chlorhexidine impregnated patch (unless allergic)
**DRESSING CHANGE:**

1. Transparent dressings may remain in place for up to seven (7) days unless wet, soiled, or non-occlusive in which case they should be changed ASAP. Any dressing containing gauze shall be changed every 2 days and PRN. The PICC Team will perform daily rounding on central lines including subclavians, midlines, PICCs, IJs, etc. (Exception: Critical Care RNs will perform all primary dressing changes on balloon pumps, Cordis, Impella, ICY, and femoral arterial lines). Unit RNs may change central line dressings if an immediate need to do so such as wet, soiled, or non-occlusive. The unit nurse needs to notify the PICC team if this occurs.

2. Explain procedure to patient.
3. Position patient supine as tolerated.
4. Have the patient turn away from the central lines dressing site. If patient is unable to do so, place a mask on the patient. Visitors must wear a mask if they are within three feet of the patient.
5. Clean the surface of the bedside table with germicidal surface wipes. Perform hand hygiene.
8. Examine site for redness, tenderness, edema, leakage, or skin reaction at suture sites.
10. Don sterile gloves for site cleaning using either single or double skin prep (see definitions).
11. Apply stabilization device arranging catheter on the skin to reduce direct exit site tension. Change stabilization device with each dressing change taking care not to move or reposition the catheter and avoiding any in or out motion.
12. Apply a Chlorhexidine impregnated patch and a sterile transparent dressing once the site is thoroughly dry. If allergic to CHG, apply dressing without using patch.
13. Leave hub of catheter outside of dressing to allow for change of tubing without changing dressing.
15. Write date of dressing change, time, and initials on dressing surface.
16. Document in the EMR.

**Needleless Connectors:**

1. Needleless connectors will be protected and disinfected by applying a curos cap and leaving the cap in place for a minimum of one (1) minute. If no curos cap is applied, the
needleless connector will be scrubbed vigorously for 15 seconds with alcohol and allowed to air dry before all accesses, and if needed if they are visibly soiled.

**Flushing:**

2. A Nurse “Flush” order should be placed in the EMR.
3. When flushing central IV lines, only sterile saline will be used. Any saline flushes drawn up by the nurse will only be used one time for one patient and will then be discarded.
4. Pre-filled normal saline syringes may be used for flushing.
5. If the pre-filled normal saline syringe is not used, saline can be drawn up prior to use with aseptic technique while sterility of the equipment and saline is maintained.
6. When administering incompatible medications, flush with at least 2.5 ml normal saline between the medications.
7. Central IV lines will be checked for patency and irrigated as per Appendix B Flushing Table.
8. Use only a 10ml syringe or larger when flushing central lines.
9. Flushing of all lines will require the use of the “push-pause” technique.
10. When flushing- follow the 10-10 change rule after blood draws or blood administration.
11. 10-10 change rule: Flush with 10ml of NS twice and if not clear, change the needleless connector.
12. Apply Curos Cap to needleless connector.

**NOTE:** CT Techs and PICC Team nurses will flush with normal saline. Notify receiving nurse that heparin flush is to be administered.

**Attaching Administration Set and Needleless Connector Changes:**

1. Obtain administration set, including extension tubing and add on devices as needed consistent with Attachment A.
2. Change administration sets and attachments every Thursday and Sunday and PRN for suspected or actual contamination or damage.
3. Needleless connectors will be changed by the primary nurse (not the PICC Team RN) every Sunday, Thursday, and PRN.
4. Needleless connectors will be changed if it cannot be cleared of blood or precipitates, is cracked or damaged or if the device is compromised in any way.
5. Do not re-attach an existing administration set to a newly placed site.
6. Apply the IV tubing label below the drip chamber.
7. Attach the solution bag to the tubing and purge air.
8. Stop electronic regulator and close the clamps on the existing
administration set if relevant.
9. Perform hand hygiene and don gloves
10. Disconnect tubing.
11. Remove the previous needleless connector.
12. Clean the hub with an alcohol swab with friction for 15 seconds and allow to air dry naturally.
14. Attach the new tubing.
15. Open clamps and resume IV infusion at the ordered rate.
16. Check to see that all of the connections are secure.
17. Apply Curos Cap to all needleless connectors.
18. Protect the IV tubing ends by applying a red cap.
19. Document on the medication record and in the electronic record in the IV Lines flow sheet and document the needleless connector change, IV tubing changes, and other maintenance related functions.

**IF HEPARIN DRIP INFUSING AND LABWORK NEEDED:**
1. Heparin starts working quickly and stops working quickly with a half-life of 1 - 2 hours. **It is important to minimize interruptions of the Heparin drip.**
2. **Do not stop the Heparin drip unless** the phlebotomist is unable to draw from the opposite arm that the heparin is infusing into. If the phlebotomist needs to draw from the same arm that the heparin drip is infusing, you must stop the drip for 5 minutes.
3. **Do not draw a PTT from a central line.** The heparin from the flushes adheres to the line and can affect PTT results. **PTT draws for patients on a Heparin drip need to be peripheral sticks.**
   **NOTE:** In the event the Phlebotomist cannot access a peripheral site, a line draw would need to be completed and communication to the Lab about the line draw should occur. Documentation of a line draw should be included on the tube such as “central line draw”.

**EQUIPMENT For removal:** obtain the following:
1. Sterile and non-sterile gloves
2. Suture removal set (will need 2 sets if culture ordered)
3. Chlorhexidine swabsticks
4. Sterile 4 x 4 gauze pads
5. Tape
6. Transparent Dressing
7. Sterile 2 x 2’s
8. Sterile plastic container (optional)

**REMOVAL OF VENOUS CENTRAL LINE:**
4. Perform hand hygiene and Identify patient.
5. Clean the work area with germicidal surface wipes.#2 to 5
6. If an IV is infusing, clamp the tubing.
7. Flush with 2.5 to 30 ml normal saline.
8. Place the patient supine in a slight Trendelenburg position, or with the head of the bed flat if Trendelenburg position is not tolerated by the patient. Have the patient turn his head away from the catheter.
9. Open the suture removal set and sterile 4 x 4s.
10. Foam hands and apply non-sterile gloves.
11. Remove the dressing gently to avoid dislodging the catheter.
12. Remove the non-sterile gloves, foam hands, and apply sterile gloves.
13. Cleanse site thoroughly with Chlorhexidine swabstick with a back-and-forth motion for a minimum of thirty seconds or consistent with the package instructions and then allow to air dry.
14. Remove sutures. Instruct the patient to take a deep breath in and hold it or alternately perform the Valsalva maneuver, and while maintaining manual pressure with a sterile dressing at insertion site, remove the catheter with a slow, even motion. The Valsalva Maneuver is accomplished with a forced expiration against a closed glottis, while holding the breath and bearing down with the mouth closed.

NOTE: If the patient’s condition warrants a culture, or if a culture is ordered, it is done at this time. There will be approximately a two-inch segment of the catheter (distal from the skin entry point) which needs to be put into culture cup and sent for the culture.
15. Withdraw the catheter consistent with above procedure for removal of venous central line.
16. Cut a 2 inch segment from the catheter tip with sterile scissors.
17. Drop the segment in a sterile specimen cup and label. Tube to the laboratory consistent with SMH policy.
18. Maintain manual pressure to the site for at least five minutes or longer, if necessary.
19. Apply sterile gauze and sterile dressing.
20. Document in the EMR.

NOTE: Observe dressing for five minutes to assess for bleeding before leaving the room. Re-check dressing for bleeding within ten minutes of catheter removal and PRN. Keep the site covered for 24 to 48 hours.

DOCUMENTATION:

a. All central line starts and attempts are to be documented in the electronic record.
b. Complete the central line checklist in EMR.
c. All documentation will be in Central Line A.
d. Central Line B, etc. shall only be used if the patient has multiple central lines present at the same time.
e. If the patient reverts to one site only, charting will commence in Central Line A.
f. Site assessment shall be documented at least once per shift in the electronic record.
g. Document in the electronic record as needed if the site requires more frequent assessment.
h. All discontinued sites will be documented.
i. Enter a nursing protocol flush order that will include heparin.
j. Flushes will be recorded on the eMAR.
k. If the site infiltrates or extravasates, or develops other complications, review cen05 Management of Vascular Access Complications and document in the Central Line Complications flow sheet once per shift until resolved or until the patient is discharged.

REFERENCE(S):


Joint Commission. National Patient Safety Goal. NPSG.07.04.01.


Appendix A

Administration Set Changes  (INS 2011 Guidelines pg. 84- CDC 2011 Guidelines pg. 19).

<table>
<thead>
<tr>
<th>Administration Set Device</th>
<th>Infusion Status</th>
<th>Frequency of Administration Set &amp; Needleless Connector Change</th>
</tr>
</thead>
</table>
| Primary & Secondary Sets  | Continuous & Intermittent | Every Sunday and Thursday, with a new site, and PRN  
Exception: IV PCA tubing will be changed every 96 hours with the IV PCA bags                                      |
| Add on devices including Dial-a-flow, filters and all other add on devices | Continuous or Intermittent | With each device change or administration set change                                                                |

<table>
<thead>
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<th>Type of Infusate</th>
<th>Administration Set</th>
<th>Frequency of Administration Set &amp; Needleless Connector Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood &amp; Blood Components</td>
<td>Intermittent</td>
<td>At the end of 4 hours (unless indicated otherwise)</td>
</tr>
<tr>
<td>Parenteral Nutrition with or without Intravenous Fat Emulsion</td>
<td>Continuous or Intermittent</td>
<td>Every 24 hours</td>
</tr>
<tr>
<td>Propofol</td>
<td>Continuous</td>
<td>Every 12 hours</td>
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## Appendix B
### Flushing Table

<table>
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<th>Device</th>
<th>Normal Saline Amount Before Infusate</th>
<th>Normal Saline After Infusate</th>
<th>Heparin Concentration and Amount</th>
<th>Lab Draws</th>
<th>Flushing Frequency with No Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral</td>
<td>2.5 ml</td>
<td>2.5 ml</td>
<td>None</td>
<td>Only during insertion</td>
<td>Every shift</td>
</tr>
<tr>
<td>Extended Dwell Catheter</td>
<td>5ml (in 10 ml syringe)</td>
<td>10 ml (in 10 ml syringe)</td>
<td>None</td>
<td>Only during insertion</td>
<td>Every shift</td>
</tr>
<tr>
<td>Midline</td>
<td>5ml (in 10 ml syringe)</td>
<td>10 ml (in 10 ml syringe)</td>
<td>5ml of 10 (ten) units per ml = 50 units</td>
<td>Only during insertion</td>
<td>Every shift</td>
</tr>
<tr>
<td>PICC or Non-Tunneled</td>
<td>5 ml (in 10 ml syringe)</td>
<td>10 ml (in 10 ml syringe)</td>
<td>5ml of 10 (ten) units per ml = 50 units</td>
<td>Stop infusion for 2 minutes. Waste 5ml blood first</td>
<td>Every shift</td>
</tr>
<tr>
<td>Hickman, Broviac, Leonard or other Tunneled</td>
<td>5 ml (in 10 ml syringe)</td>
<td>10 ml (in 10 ml syringe)</td>
<td>5ml of 10 (ten) units per ml = 50 units</td>
<td>Stop infusion for 2 minutes. Waste 5ml blood first</td>
<td>Every day</td>
</tr>
<tr>
<td>Tunneled Groshong</td>
<td>5 ml (in 10 ml syringe)</td>
<td>10 ml (in 10 ml syringe)</td>
<td>None</td>
<td>Stop infusion for 2 minutes. Waste 5ml blood first</td>
<td>Every day</td>
</tr>
<tr>
<td>Implanted Ports, Lifeport or Passport</td>
<td>5 ml (in 10 ml syringe)</td>
<td>10 ml to 20 ml</td>
<td>5ml of 100 (hundred) units per ml = 500 units</td>
<td>Stop infusion for 2 minutes. Waste 5ml blood first</td>
<td>Every day</td>
</tr>
</tbody>
</table>
Patient Arrives to Unit/Floor
Patient has Central Line (Internal Jugular, Subclavian and PICC) upon Arrival

Suspected Midline?
If Unable to determine if a PICC Line or a Midline, Do Not Use Line
Consult PICC Team and Insert Peripheral Site

- **Yes**
  - Assess and Use CL

- **No**

  - **Yes**
    - Is Patient Serial? (For Infusion Center)
      - **Yes**
        - Assess and Use CL
      - **No**

  - **No**

  - **Yes**
    - Is CXR Already Ordered?
      - **Yes**
        - Initiate Flush Order
        - Set in SCM
        - **Yes**
          - Sign form & Shield for CXR or Insert Peripheral
        - **No**
        - Obtain CXR
        - Notification of CXR Results
          - CL Tip in Place
            - Use CL
          - CL Tip Not in Place
            - Do Not Use CL
            - Insert Peripheral
          - CXR Abnormal
            - Notify Physician
        - CXR Abnormal
          - Notify Physician
      - **No**

If ECC Patient and expected to be discharged, consider risks versus benefits and assess site.
If questionable, obtain alternate access.
Appendix D

Procedures for Blood Sampling (for central lines, but excluding PICC Lines)

1. Identify the patient per SMH policy 01.PAT.09 Patient Identification Inpatient/Outpatient
2. Prior to collecting specimens in areas where armbands are required, each specimen label must be verified against the patient's armband using 2 identifiers. In areas where armbands are not required, each specimen label will be checked against patient's verbal verification.
3. Stop the administration of the IV solution for no longer than two minutes.
4. Perform hand hygiene and don clean gloves
5. Scrub the hub and allow to air dry.
6. Flush the selected lumen with 10 mL of sterile normal saline (with TPN infusing, flush with 20 mls).
7. Using the same syringe, aspirate a small amount of blood and fluid (5-10 mL minimum) by slowly pulling and holding the plunger. Discard the syringe.
8. Obtain the specimen using a second 10 mL syringe or a vacutainer.
9. Flush the catheter using a “stop-start” or ‘pulse” technique with a minimum of 20 mL of sterile normal saline immediately following withdrawal of a blood sample. Use a 10 mL or larger syringe.
10. Change connector if unable to clear the blood.
11. Transfer the blood specimens into the blood tubes using a needleless transfer device if vacutainer was not used.
12. Label the vacutainers with the appropriate patient identification label at bedside per policy 01.LAB.12.
13. Perform Final Check verification for EACH specimen collected by reading out loud the last 3 digits of the patients visit number on the specimen label and then reading out loud the last 3 digits of the patient visit number on the patient identification band.
15. Apply Curos caps.