


<b>Infection Control Manual</b>		
	Policy Name	<b>The Prevention of Intravascular Catheter-Related Infections</b>
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	Responsible for Content	<b>Hospital Epidemiology</b>

## I. Description

Describes the infection control guidelines to prevent intravenous catheter-related infections.

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## II. Rationale

Intravascular catheters provide a route for microorganisms to enter the vascular system bypassing normal skin defense mechanisms and putting the patient at risk for local and systemic infectious complications. Strict adherence to the guidelines in this policy can reduce the risk of a vascular catheter infection.

## III. Policy

### A. General Recommendations for All Intravascular Catheters

For additional guidelines, refer to Nursing Policies:

- [Peripheral Intravenous Device and Venipuncture](#)
- [Central Venous Access Device \(CVAD\) Care and Maintenance](#)
- [Parenteral Nutrition](#)

#### 1. Health Care Worker Education and Training

Initial and ongoing education and training of health care workers who manage intravascular catheters is conducted by the Venous Access Team, Nursing Department, and Nursing Practice and Professional Development. Education includes indications for the use of and procedures for the insertion and maintenance of intravascular devices, and appropriate infection control measures to prevent

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intravascular catheter-related infections. Hospital Epidemiology personnel will conduct surveillance for intravascular device-related infections to determine infection rates, monitor trends in those rates, and assist in identifying lapses in infection control practices.

### 2. Hand Hygiene

Wash hands for a minimum of 15 seconds using an antiseptic-containing product (e.g., 2% chlorhexidine gluconate [CHG]) before palpating, inserting, changing, removing, or dressing any intravascular device. A waterless alcohol-based hand rub (ABHR) is an acceptable alternative to antiseptic soap and water if hands are not visibly soiled. The use of gloves does not replace the need for hand hygiene.

### 3. Patient Assessment

- a. Monitor the catheter site per nursing policy, visually or by palpation through the intact dressing. When the catheter is used for continuous infusion, assess the site hourly for pediatric patients (ages 12 and under) and every 4 hours for adults. A med-locked catheter site is assessed every 8 hours in Adults and every 6 hours in Pediatrics and before use. If the patient has tenderness at the insertion site, fever without obvious source, or other manifestation suggesting local or bloodstream infection, the dressing should be removed to allow thorough examination of the site. If signs of infection are present, notify the patient's licensed independent practitioner (LIP).
- b. Record the date and time of catheter insertion in the patient record.
- c. Do not routinely perform surveillance cultures of patients or devices used for intravascular access.

### 4. Catheter Removal

Discontinue an intravascular device as soon as it is no longer clinically indicated. There should be a daily assessment for need of CVADs and the device removed when no longer clinically indicated.

### 5. Skin Antisepsis

- a. Disinfect clean skin with an appropriate antiseptic before catheter insertion and at the time of dressing change. A 2% chlorhexidine gluconate and alcohol preparation is preferred. Alternatively, 70% alcohol, 10% povidone-iodine, or 2% tincture of iodine may be used. The antiseptic should be liberally applied and allowed to dry prior to catheter insertion. Allow povidone-iodine to remain on the skin for at least 2 minutes or longer if not yet dry before inserting the catheter. In general, the antiseptic should not be removed with alcohol or sterile water. When wearing clean gloves for PIV catheter insertion, do not touch the access site after application of antiseptic.

For patients in NCCC, non-tinted Chloraprep is used for skin preparation for PIV and PICC insertion except for those babies weighing 1000 grams or less. For patients 1000 grams and less, Betadine is used for the first week of life and then Chloraprep is used. Prep solution is removed with sterile water after catheter has been inserted.

- b. Do not apply organic solvents (e.g., acetone or ether) to the skin before insertion or during dressing change.

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- c. If a topical skin anesthetic is used, the manufacturer's recommendations should be followed and the agent applied in a manner to prevent contamination of the container.
  - d. When changing the central catheter dressing, use clean gloves to remove the old dressing and sterile gloves to apply the new dressing, performing hand hygiene before applying gloves and then between glove change. A mask is worn for the dressing procedure.
  - e. If the patient is diaphoretic, or if the site is bleeding or oozing, use sterile gauze held in place by either a transparent dressing or tape. The dressing must be changed every 48 hours.
  - f. Immediately remove IV site dressings and apply a new dressing whenever the dressing becomes damp, loosened, or soiled. Do not reinforce loose dressings by adding gauze or tape.
  - g. Do not routinely replace IV site dressings for pediatric patients when the risk of dislodging the catheter outweighs the benefit of the dressing change.
  - h. Do not submerge the catheter under water (e.g., tub baths or swimming). Showering is permitted if precautions are taken to reduce the likelihood of introducing organisms into the catheter; e.g., use an impermeable covering for the catheter and connecting device during the shower.
  - i. Do not use topical antibiotic ointment to the insertion site during dressing changes because of the potential to promote fungal infections and antimicrobial resistance.
6. Intravascular Devices
- a. Administration Set
    - i. Replace administration sets including secondary sets, add on devices, and all needleless access devices every 96 hours
    - ii. Change tubing if a catheter related infection is suspected or documented.
    - iii. Extension tubing attached to the catheter should be treated as part of the catheter
    - iv. Tubing/bag connection must be prepped with alcohol swab for 15 seconds and allowed to dry prior to removing old tubing and spiking new bag.
    - v. Any left over, unused IV set-ups should be discarded when expired.
    - vi. Change IV tubing whenever contamination is suspected (e.g., uncapped end of tubing falls on the floor or bed)
  - b. Tubing
    - i. Tubing should be changed every 96 hours
    - ii. Exception:
      - Lipid- Free Parenteral Nutrition (PN) tubing
        - Adults: Change tubing every 24 hours
        - Pediatrics: Change tubing at least every 96 hours
      - Lipids and Lipid Containing Parenteral Nutrition (PN)

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- Adults & Pediatrics: Change tubing every 24 hours
  - Propofol
    - Change tubing every 12 hours
  - Blood
    - Do not exceed 4 hours for infusion duration
    - Dispose of all blood products and administration tubing after 4 hours.
    - **Note:** Do not infuse multiple units through the same blood administration tubing unless you are certain all units will completely infuse in less than 4 hours.
    - After 4 hours of use, the blood administration tubing filter becomes full of product debris and will decrease the flow rate and damage the red cells.
  - Vasopressors or other Life Supporting Medications
    - For critically ill patients who are receiving vasopressors or other life supporting medications a manifold stopcock system, it is allowable to delay changing the manifold. When the patient's condition improves, the manifold should be changed at the same interval as the remainder of the administration sets.
- iii. Label IV tubing with the date the IV tubing is hung, date tubing is due to be changed and initials.
- iv. It is not necessary to change the IV fluids at the time the tubing is changed unless the bag has been hanging for 96 hours or contamination is suspected.
- c. Prime & Spike
- i. Preoperative areas (PCS), VIR, Cardiac Cath Lab, PACU, GI procedures, and outpatient infusion areas are allowed to spike and prime IV sets up to 96 hours.
  - ii. Ready-to-use IV set-ups must be maintained in a secured manner until used.
  - iii. Label prime and spiked bag with date and time it was spiked, date it is due to expire and initials.
  - iv. Any left over, unused IV set-ups should be discarded when expired.
- d. Suspected Infections
- i. Change all IV tubing whenever a catheter is removed due to a suspected catheter-related infection.
- e. The bag of IV fluid (including PN) must be changed if sterility of the bag is compromised during entry or re-spiking.
- f. Using a circular motion (like juicing an orange), vigorously cleanse needleless access ports with an alcohol swab for 15 seconds prior to accessing. For

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sequential access, follow the manufacture's recommendation for use. OneLink needless access devices require cleansing the device for each access, including sequential accesses. Refer to NURS 0074: Central Venous Access Device Care & Maintenance Policy for further information.

- g. The IV system should remain a closed system. If tubing must be disconnected, use aseptic technique to prevent contamination. The catheter must be capped with a needless access port and the administration set tubing closed with a sterile plastic cap.
7. Pressure Monitoring Systems (Arterial and Venous)
- a. Keep sterile all devices and fluids that come into contact with the fluid of the pressure monitoring circuit (e.g., calibration devices, heparinized saline).
  - b. Minimize the number of manipulations and entries into the pressure-monitoring system. Use a closed-flush system (i.e., continuous flush), rather than an open system (i.e., one that requires a syringe and stopcock), to maintain the patency of the pressure-monitoring catheters. If stopcocks are used, treat them as sterile and cover them with a sterile cap or syringe when not in use.
  - c. When the pressure-monitoring system is accessed through a rubber diaphragm rather than a stopcock, cleanse the diaphragm with an appropriate antiseptic before and after accessing the system.
  - d. Maintain line patency with normal saline or heparinized normal saline per unit/pharmacy protocol.
  - e. Replace the pressure monitoring system every 96 hours.
  - f. Do not administer dextrose-containing solutions or parenteral nutrition fluids through the pressure monitoring circuit.
8. Preparation and Quality Control of Intravenous Admixtures
- a. Admix all parenteral fluids in the Pharmacy under a laminar-flow hood using aseptic technique. Clinically urgent IV admixtures prepared by nursing must be replaced as soon as possible by fluids prepared by pharmacy and may hang for a maximum of 24 hours. Strict aseptic technique must be used when preparing these solutions. Refer to the Pharmacy Infection Control Policy.
  - b. Check all containers of parenteral fluid for visible turbidity, leaks, cracks, particulate matter, and the manufacturer's expiration date before use and discard if present or solution expired. In addition to patient identification, a distinctive supplementary label should be attached to each parenteral nutrition admixture (PN) stating, at a minimum; volume of solution, the additives and their dosages, the date and time of compounding, the expiration date and time.
  - c. Medication Vials
    - i. Cleanse the rubber diaphragm of single dose medication vials with alcohol and allow to dry prior to entering. Single use vials should be accessed only once using a sterile syringe and needless access device. Any unused medication should be appropriately discarded.
    - ii. For multi-dose vials, refer to the UNC Health Care Operational Policy: "Medication Management: Use of Multi-Dose Vials of Parenteral Medications in Acute Care and Ambulatory Care Environments."

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iii. If a sterile access device (vial adaptor) is used, a new sterile syringe must be used for each access. Cleanse the access port with alcohol for 15 seconds prior to accessing.

### d. Propofol

Strict aseptic procedures are required during preparation and administration of propofol. If propofol is administered directly from the vial, administration should be completed within 12 hours after the vial is spiked. The tubing and any unused propofol should be discarded after 12 hours. Always disinfect the vial rubber stopper with 70% alcohol and allow to dry prior to spiking. If propofol emulsion is transferred to a syringe or other container prior to use, administration should be started and completed within 6 hours after the container is opened. Propofol is a single-use parenteral product.

## 9. "Hang Time" for Parenteral Fluids

These guidelines apply to the bag of fluid only. See "Intravascular Device Tubing" (section III.A.6.) for frequency of administration set replacement.

- a. Commercially prepared parenteral fluids (e.g. normal saline, D5%) can hang for a maximum for 96 hours.
- b. Admixed by pharmacy (under a laminar flow hood) parenteral fluids hood can hang for a maximum of 48 hours. Beyond use dating allows the admixed fluids to hang for 48 hours after the bag is spiked.
- c. Parenteral fluids admixed on the unit must be replaced as soon as possible by those prepared in pharmacy, but may hang for a maximum of 24 hours. These fluids include all medication drips and syringe pump infusions, prepared by the nurse on the patient care unit. The type of medication, the manufacturer, or Pharmacy may indicate a shorter expiration time.
- d. Parenteral nutrition fluids (PN)/lipids should be completed within 24 hours or no longer than specified expiration on label.
- e. Infusions of blood and blood products should be completed within 4 hours of hanging.
- f. Epidural fluids may hang no longer than 48 hours.
- g. Patient Controlled Analgesia (PCA)
  - i. Commercially prepared PCA fluids can hang per the manufacturers' recommendations of 96 hours
  - ii. PCA fluids admixed in pharmacy can hang for a maximum of 48 hours

## 10. In-Line Filters

Do not routinely use filters for infection prevention purposes. In-line filters are used with PN to prevent infusion of precipitates.

## 11. Prophylactic Antimicrobials

Do not routinely administer antimicrobials for prophylaxis of catheter colonization or bloodstream infection before insertion or during use of an intravascular device

Prophylactic Antibiotic Lock Therapy might be considered in high-risk patients to prevent CLABSIs in lines that are infrequently accessed such as dialysis and

chemotherapy lines. The Antibiotic Lock Therapy protocol may be accessed via Pharmacy's Intranet website.

## B. Additional Recommendations for Peripheral Venous Catheters

### 1. Selection of Catheters

- a. Select catheters based on the intended purpose and duration of use, known complications (e.g., phlebitis and infiltration), and experience at the institution. Use a Teflon catheter or a polyurethane catheter which are preferred over a steel needle.
- b. Avoid the use of steel needles for the administration of fluids/medications that may cause tissue necrosis if extravasation occurs.

### 2. Selection of Insertion Site

- a. Considerations for selection of insertion site include:

- i. Maintenance of asepsis and risk of infection
- ii. Risk of mechanical complications
- iii. Patient-specific factors (e.g., preexisting catheters, anatomic deformity)
- iv. Security
- v. Comfort

- b. Major risk factors for infection

The density of skin flora at the insertion site and risk of thrombophlebitis are major risk factors for infection. Lower extremity insertion sites are associated with higher risk of infection than upper arm extremity sites, in adult patients.

- c. Insertion site selection based on age

- i. In adults, use an upper extremity site in preference to one on a lower extremity for catheter insertion (e.g., hand, wrist, and arm). Replace a catheter inserted in a lower extremity site to an upper extremity site as soon as possible.
- ii. In pediatric patients (1-12 years of age) insert the catheter into the veins of the hand, wrists, or forearm. At the request of the patient's physician, lower extremities may also be used but this is recommended for non-ambulatory children only and when no other site is available. Refer to Nursing Procedure: "Peripheral Intravenous Device and Venipuncture."
- iii. In children <1 year of age, insert the catheter preferably in the superficial veins of the hands, arms, feet, or legs. Scalp veins (in neonates or young infants) can be used as the catheter insertion site.

### 3. Catheter Insertion

- a. Perform hand hygiene before putting on gloves. Wear clean gloves during catheter insertion. **Do not cut off glove's fingertip.**
- b. Refer to section III.A.5. of this policy for skin preparation.

### 4. Catheter-Site Dressing

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- a. Peripheral venous/arterial catheters are dressed with a sterile transparent dressing. If the peripheral venous catheter cannot be rotated to a new site every 7 days, the dressing should be changed every 7 days **or whenever damp, loosened or soiled**. Change dressing according to the Nursing PIV Device and Venipuncture Policy.
  - b. Central venous catheters (including Peripherally Inserted Central Catheters – PICC's) are dressed using a sterile transparent dressing (e.g., Tegaderm<sup>®</sup>, Sorbaview<sup>®</sup>). The dressing is changed every 7 days, as long as it remains clean, dry and intact. Change the dressing **whenever damp, loosened or soiled**.
    - i. If the patient is diaphoretic, or if the site is bleeding or oozing, use sterile gauze held in place by either a transparent dressing or tape. The dressing must be changed every 48 hours.
  - c. Refer to nursing policy Central Venous Access Device (CVAD) Care & Maintenance.
  - d. For central venous catheters placed in the internal jugular vein, a SORBAVIEW IJ dressing<sup>™</sup> is recommended.
  - e. A CHG-impregnated patch (e.g. Biopatch) should be used on central venous access devices and midline catheters for inpatients unless contraindicated. Contraindications include sensitivity to product, umbilical catheter, and use on PICC lines with premature infants in NCCC. The patch should be placed around the insertion site within 24 hours of catheter placement. If the dressing must be changed prior to the 7 day time period, the CHG-impregnated patch also should be changed at that time.
5. Catheter Change
- a. In all patients >12 years of age, change peripheral venous catheters and rotate peripheral venous sites every 7 days or sooner based on clinical assessment.
  - b. In pediatric patients (ages 12 and under), catheters are not routinely rotated.
  - c. In adults, remove catheters inserted under emergency conditions, where breaks in aseptic technique are likely to have occurred. Insert a new catheter at a different site as soon as feasible (<24 hours).
  - d. Remove peripheral venous catheters and notify the patient's physician when the patient develops signs of phlebitis, purulent thrombophlebitis or cellulitis (i.e., warmth, tenderness, erythema, palpable venous cord) at the insertion site and when patient develops an IV related bacteremia.
6. Medlocks: peripheral and central
- a. Cleanse the medlock access port with alcohol for 15 seconds prior to accessing.
  - b. Routinely flush peripheral venous medlocks per nursing policy.
  - c. Replace the medlock peripheral venous catheter every 7 days.
  - d. All infection control guidelines for peripheral venous catheters and central venous catheters receiving a continuous infusion apply to medlocks that are used for intermittent infusion.
  - e. Medlocking IVs for patient transport:



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- Should only be done for patient safety reasons, not convenience
- If necessary for patient safety, the process should be done aseptically
  - Sterile dead end cap placed on end of line (do not connect IV tubing back into the needleless access port).
  - For reconnection, needleless access device (e.g. Onelink) should be disinfected with alcohol prior to reconnection.

### 7. Midline Catheters

- a. Midline catheters are inserted by a Venous Access Team Registered Nurse and are used for patients who are receiving iso-osmotic, non-irritating IV medications for greater than 6 days.
- b. Standard peripheral catheters do not extend beyond the axillary region (do not enter a central vein). These catheters have a lower rate of phlebitis than short peripheral catheters and are not routinely changed.
- c. The site dressing is changed every 7 days (transparent dressing) or whenever damp, loosened, or soiled.
- d. For care and maintenance of Midline Catheters refer to [Nursing Policy NURS 0605: Midline Catheter: Adults.](#)

### 8. Catheter Site Care

Do not apply topic antimicrobial or antiseptic ointment/cream to the insertion site of peripheral venous catheters.

## C. Additional Recommendations for Central Venous Catheters

(Including PICC, Pulmonary Artery Catheters in Adult and Pediatric Patients)

1. Patients/family member should be educated regarding measures to prevent catheter-associated infections and documented.
2. Selection of Catheters
  - a. Use a catheter with the minimum number of ports or lumens essential for the management of the patient.
  - b. A peripherally inserted central catheter (PICC) may be indicated when the duration of therapy is expected to exceed 6 days.
  - c. Use tunneled catheters (i.e., Powerlines, Hickman or Broviac) or implantable vascular access devices (i.e., ports) when long-term vascular access (>30 days) is anticipated. Use totally implantable access devices for long-term intermittent venous access. Use a tunneled catheter for frequent or continuous access.
3. Selection of Insertion Site

In adult patients, the risk and benefits of different insertion sites (e.g., subclavian vein vs. internal jugular vein) must be considered on an individual basis with regard to infectious and noninfectious complications. Avoid using the femoral vein for central venous access in adult patients when the catheter is placed under planned and controlled conditions.
4. Catheter Insertion

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- a. Central catheters should be inserted with maximal sterile barrier technique (e.g., patient draped in a sterile drape from head to toe) using sterile equipment. This includes sterile gloves, sterile gown, hair covering and a surgical mask with eye protection.
  - b. A checklist can be used as a reminder for important elements of insertion. Here is a link to the [Central Line Insertion Check List](#) also, the triple lumen and introduce kits contain check lists in the plastic sleeves to reference.
  - c. Needle-guided access using ultrasound technology should be used for CVAD insertion whenever possible to reduce the risk of mechanical complications and infection. Transilluminators may also be used for catheter insertion. If used on intact skin, this equipment may be disinfected between use on different patients using an EPA-approved cleanser/disinfectant product (e.g., Metriguard, Sani-Wipes). If this equipment is used on non-intact skin (e.g., a burn wound), it requires high-level disinfection (e.g., Cidex). If ultrasound gel is applied to the skin within the sterile field, sterile gel must be used (available in single-use packets). When using ultrasound technology within a sterile field, a sterile probe cover is required.
  - d. When inserting the catheter, a wide field should be prepped using a 2% chlorhexidine gluconate and alcohol solution (e.g. Chloraprep) unless there is a contraindication in which case 70% alcohol or 10% povidone iodine may be used. See umbilical catheter section for exceptions in neonates. Solutions should be allowed to air dry.
  - e. Use a sterile sleeve to protect pulmonary artery catheters during insertion.
  - f. The catheter site should be dressed immediately after insertion.
    - i. Temporary (<30 days) non-tunneled catheters (e.g., triple lumen catheters) should be dressed immediately after insertion. This includes catheters placed in Vascular Interventional Radiology (VIR) and the Operating Room (OR).
    - ii. Long term tunneled catheters (e.g., broviacs, hickmans) are dressed as a central line. Patients admitted to the hospitals with existing catheters should have a new catheter dressing placed within 24 hours of admission.
    - iii. Implanted ports are dressed as a surgical wound immediately after placement. When the port is accessed with a non-coring needle (e.g., Port Safety Needles), the site is dressed as a central line. The dressing and non-coring needle are changed every 7 days.
5. Catheter Changes
- a. Do not routinely replace temporary central venous catheters or PICCs as a method to prevent catheter-related infections.
  - b. Do not routinely replace pulmonary artery catheters more frequently than 7 days as a method to prevent catheter-related infection.
  - c. Do not remove CVC or PICCs solely because of fever. Use clinical judgment regarding the appropriateness of removing the catheter if there is evidence of infection elsewhere. Obtain both central line and peripheral blood cultures to assist in decision-making.
  - d. Guidewire Exchange

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- i. Routine guidewire exchange of nontunneled catheters has not been shown to reduce CRBSI and should be avoided.
    - ii. Use a guidewire exchange to replace a malfunctioning non-tunneled catheter if there is no evidence of infection and the risk of inserting a catheter into a new site is unacceptably high. This procedure is completed using the same aseptic technique as used to place a new central line.
    - iii. Use full barrier precautions (haircover, mask, sterile gown, gloves, towels, drape) and site preparation as if placing a new catheter in a new site. Use a new set of sterile gloves prior to handling the new catheter.
  - e. Do not use guidewire-assisted catheter exchange whenever catheter-related sepsis is documented or tunnel/IV site infection is present. If the patient requires continued vascular access, remove the implicated catheter and replace it with another catheter at a new site.
6. Flush Solutions and Anticoagulants
- a. Patients with a positive HIT test (heparin induced thrombocytopenia) or pending HIT test result should not receive heparin. Use of a positive or neutral pressure cap is recommended.
  - b. Use commercially prepared flush solutions.
7. Additional Recommendations for Hemodialysis/Apheresis Catheters
- a. Selection of Catheter  
Use cuffed tunneled central venous catheters for hemodialysis if the period of temporary access is anticipated to be prolonged (i.e., >3 weeks). Use a fistula or graft instead of a central catheter for permanent access.
  - b. Selection of Insertion Site  
Use the jugular or femoral vein rather than a subclavian vein to avoid venous stenosis.
  - c. Catheter Insertion  
Whenever possible, these catheters should be placed in Vascular Interventional Radiology or the Operating Room. If, under emergent conditions, the catheter must be placed outside these areas, follow the insertion guidelines for central venous catheters provided in this policy.
  - d. Catheter Changes  
Do not routinely replace hemodialysis catheters as a method to prevent catheter-related infection. There is no routine change required for hemodialysis/apheresis catheters. Refer to the catheter change section for Central Venous Catheters in this policy for additional information regarding catheter changes.
  - e. Additional Guidelines
    - i. Catheters, shunts, fistulas, femoral, subclavian, or other vascular access catheters (e.g., ECMO cannulas) will be cared for using meticulous aseptic technique. Hemodialysis Policies and the Apheresis Catheter Policies describe in detail care for these devices. ECMO vascular access

catheter care is performed following the guidelines in the ECMO Nursing Policy.

- ii. Only hemodialysis staff/nephrologists may access catheters used for dialysis. The only exception to this policy would be in the event of a life threatening medical emergency where rapid vascular access is required for resuscitation. If the catheter is being considered for other purposes, the Nephrology Consult Service should be contacted.
- iii. Hemodialysis and Apheresis staff will perform catheter dressing changes on treatment days when indicated. When dressing changes are performed by other clinical personnel, follow the guidelines provided in this policy and nursing policy.

#### **D. Management of Parenteral Nutrition (PN)**

Although parenteral nutrition can be a lifesaving therapeutic modality, complications are possible. Reported complications include metabolic derangements, hepatic injury, sepsis, thrombosis of central veins, and extravasation of fluid. However, the most frequently noted serious complications of parenteral nutrition have been metabolic derangements and sepsis. Refer to the PN Nursing Policy for additional guidelines.

##### **1. Guidelines for Administration of Parenteral Nutrition (PN) Therapy**

- a. Parenteral nutrition therapy (PN) is initiated only when indicated by the patient's clinical requirements. The need for parenteral nutrition must be balanced against the risks inherent in such therapy.
- b. Parenteral nutrition therapy (PN) should be prescribed and closely supervised by a provider who is thoroughly versed in the techniques and risks of such therapy.
- c. Adult patients receiving Parenteral Nutrition therapy (PN) at UNC Health Care are overseen by a team of individuals with a particular interest and expertise in the field of parenteral nutrition. This team includes a nurse, pharmacist, dietitian and physician who oversee the metabolic monitoring of adult patients receiving PN and teach sound infection control principles and techniques to physicians and nurses charged with the care of parenteral systems.
- d. For patients who are receiving PN on a long term basis, disconnection at the PN tubing/catheter junction may be necessary under the following circumstances:
  - i. PN Cycling: PN can run over shorter time periods, such as 12, 14, 16, or 20 hours. Each time period is called a "cycle." If tubing must be disconnected, use aseptic technique to prevent contamination. The catheter must be capped with a needleless access port and the administration set tubing closed with a sterile plastic cap. The tubing may be reattached to the catheter junction as long as aseptic technique is used, no contamination is suspected and the PN bag has not expired past 24 hours.
  - ii. Central line change and no infection is suspected: The disconnected tubing must be capped with a sterile device using aseptic technique. After the catheter is changed and placement verified by x-ray, the tubing may be reattached to the catheter junction as long as aseptic technique is used and no contamination is suspected.
  - iii. Central line change and infection is suspected: new tubing must be attached to the PN bag. The bag/spike connection must be prepped for 15 seconds

with alcohol and allowed to dry prior to removing the old tubing. Spike the bag with the new tubing using aseptic technique. If the bag was contaminated during re-spiking, the old bag of PN fluids will need to be replaced with a new PN bag from Pharmacy as soon as available and new tubing attached.

For TPN provided by Adult TPN/PEN Service if line infection is suspected, discard all tubing and PN bags and receive orders from provider for dextrose containing solution (e.g. D5%)

- e. See Administration Sets Above for description of tubing change guidelines for PNPN administration should be discontinued immediately if signs of extravasation are observed. Appropriate measures to prevent hypoglycemia with loss of central PN should be instituted simultaneously.
- f. The physician must be notified of signs of inflammation, erythema or purulent drainage at the IV catheter site. However, catheters may be the source of septicemia even if local signs of inflammation are not present.
- g. In some instances, parenteral Nutrition may also be delivered via peripheral IV catheters.
- h. Once PN is started through a lumen do not use that lumen for any other purpose (e.g., administration of fluids, blood/blood products). Do not rotate the PN lumen. PN catheters remain in place for long periods of time and have the highest risk of infection. Exceptions may be made with an LIP's order.

#### **E. Peripheral Arterial Catheters**

##### **1. Arterial Catheter Insertion**

- a. A cap, mask, sterile gloves, and a large sterile fenestrated drape should be used during peripheral arterial catheter insertion.
  - i. For peripherally inserted arterial catheters in the neonatal population, minimally sterile gloves and mask is required during insertion.
- b. The site is prepped and dressed using guidelines for peripheral venous catheters.
- c. Use disposable, rather than reusable, transducer assemblies.
- d. Replace transducers at 96 hour intervals. Replace other components of the system (e.g., tubing, continuous flush device, flush solution) at the time the transducer is replaced.

##### **2. Arterial Catheter Changes**

- a. Replace arterial catheters only when there is a clinical indication.

#### **F. Recommendations for Umbilical Catheters**

##### **1. Catheter Insertion/Care**

- a. Umbilical arterial and venous catheters are placed using sterile technique with sterile barrier, gowns, masks, and gloves. Hair and beards must be covered.
- b. Cleanse the umbilical insertion site with an antiseptic before catheter insertion. Avoid tincture of iodine because of the potential effect on the thyroid. Povidone iodine may be used.

## Prevention of Intravascular Catheter-Related Infections

- c. Dressings are not routinely applied.
  - d. Add low dose heparin to fluid infused through umbilical artery catheters.
  - e. Do not use topical antibiotic ointment or creams on an umbilical catheter insertion site.
  - f. Replace IV tubing and all add on devices at least every 72 hours; lipid-containing lines are changed every 24 hours.
  - g. Complete infusions of lipid containing fluids within 24 hours of hanging the fluid.
2. Catheter Changes
- a. Umbilical catheters should be removed as soon as no longer essential for medical management or for any signs of catheter-related bloodstream infection.
  - b. Umbilical catheters are not routinely changed.
  - c. Optimally, remove umbilical arterial catheters within 5 days. Umbilical venous catheters can be left in place up to 14 days if managed aseptically.

### **G. Special Considerations – Documentation**

Licensed Independent Practitioners (LIPs) and/or nurses should document the following:

1. Placement of IV lines under nonsterile conditions such as in emergencies.
2. Use of hemodialysis, PN catheters for other purposes.
3. Inability to change a catheter despite known or probable catheter sepsis.
4. Inability to follow recommended line change times (e.g., peripheral IV every 96 hours).
5. Any line related complications (e.g., phlebitis, extravasation with tissue damage, sepsis).
6. Education of patients and caregivers of patients going home with central line catheters is documented in the electronic medical record.

### **Management of Stopcock Ports**

1. Stopcocks should be used only when absolutely necessary, as in the care of critically ill patients.
2. Prep all ports with alcohol and let dry prior to access
3. Stopcock ports must be covered with a sterile cap. Never reuse an old cap. Stopcocks on venous lines (not arterial lines) should be capped with a needleless access cap and all accesses should be through the cap.
4. Flush stopcock immediately if blood is seen in the port.

### **H. IV-Related Infections**

1. Notify the LIP if there is a suspicion of site infection. Clean site and cover with a small occlusive sterile dressing.
2. If an IV system is to be discontinued because of suspected IV-related infection, such as purulent thrombophlebitis or bacteremia, the skin at the skin-cannula junction should be cleaned with CHG/alcohol allowing 30 second contact time and allowed to

## Prevention of Intravascular Catheter-Related Infections

dry before cannula removal, and the cannula should be cultured using a semi-quantitative technique.

- a. Notify Hospital Epidemiology 984-974-7500 of any suspected contamination of IV fluids.
- b. If contamination of fluid is confirmed, the implicated bottle and the remaining units of the implicated lot should be saved, and the lot numbers of fluid and additives should be recorded.
- c. If intrinsic contamination (contamination during manufacturing) is suspected, the local health authorities, CDC, and the U.S. Food and Drug Administration should be notified immediately.

### **I. Responsibility Statement**

Implementation of this policy is the responsibility of Nursing service line directors, Vascular Access Team, Nutrition Support Service, and Medical Staff.

### **IV. References**

CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011.

Infusion Nurses Society. Infusion Nursing Standards of Practice. Journal of Infusion Nursing. Jan/Feb 2016.

Infusion Nurses Society. (2011) Policies & Procedures for Infusion Nursing, 4<sup>th</sup> Edition.

### **V. Reviewed/Approved by**

Hospital Infection Control Committee

### **VI. Original Policy Date and Revisions**

Revised on Apr 2005, July 2007, May 2010, May 2013, May 2016, Aug 2017<sub>rev</sub>, Feb 2018<sub>rev</sub>

**Appendix 1: Quick Reference Timing for Tubing Changes**

<b><u>Tubing</u></b>	<b><u>Adult Patients</u></b>	<b><u>Pediatric Patients</u></b>	<b><u>Notes</u></b>
Regular Fluids (e.g. D5%, NS, secondary set)	Every 96 Hours	Every 96 Hours	Discard if Contaminated
Parenteral Nutrition w/out lipids	Every 24 Hours	At Least Every 96 Hours	
Lipids & Lipid containing PN (e.g. 3 in 1)	Every 24 Hours	Every 24 Hours	
Propofol	Every 12 Hours	Every 12 Hours	
Blood Products	Discard after 4 Hours	Discard after 4 Hours	Note: Do not infuse multiple units through the same blood administration tubing unless you are certain all units will completely infuse in less than 4 hours.



**Appendix 2: Quick Reference: Hang Time Reference for Parenteral Fluids**

<b><u>Parenteral Fluid</u></b>	<b><u>Hang Time</u></b>	<b><u>Notes</u></b>
Commercially Manufactured	Max 96 Hours	As long as no additions by pharmacy (e.g. normal saline, D5%)
Admixed by Pharmacy	Max 48 Hours	Beyond Use Dating allows admixed fluids to hang for 48 hours after the bag is spiked.
Admixed by Nurse on Unit	Max 24 Hours	Should be replaced as soon as possible
Blood Products	Max 4 Hours	Complete within 4 hours
Epidural Fluids	Max 48 Hours	Must be replaced within 48 hours.
Parenteral Nutrition/Lipids	Max 24 hours	Should be complete within 24 hours or no longer than specified expiration date
Patient Controlled Analgesia	Max 96 hours	Must be consistent with manufacturers' recommendations.