I. PURPOSE

To provide UWHC health care providers a comprehensive policy derived from evidence-based practice components for the insertion, use, maintenance, replacement, and discontinuation of intravascular catheters. More specific procedural information relating to specific catheter types may be obtained by reviewing the policy and procedure cross-references found near the end of this policy.

II. GENERAL POLICY STATEMENTS FOR ALL INTRAVASCULAR CATHETERS USED IN ADULT AND PEDIATRIC PATIENTS

A. Health care staff must be properly educated regarding:
   - Indications for intravascular catheter use and replacement;
   - Proper procedures for catheter insertion and maintenance; and
   - Proven measures to prevent catheter-related bloodstream infections and other complications associated with intravascular catheters.

B. Designated medical and nursing staff will periodically assess competence and adherence to protocols outlined in this policy for all individuals who insert and manage intravascular catheters.

C. Catheter sites will be assessed visually or by palpation through the intact dressing on a daily basis. The frequency of examination will depend on the clinical situation for the individual patient. If the patient has tenderness at the insertion site, fever without obvious source, or other manifestations suggesting local or bloodstream infection, the dressing should be removed to allow thorough examination of the site.

D. Health care provider hand hygiene: wash hands with antiseptic-containing soap and water or use waterless alcohol-based gels or foams. Use of gloves does not obviate the need for hand hygiene.
   1. Hands will be washed before and after palpating catheter insertion sites, as well as, before and after inserting, replacing, accessing, repairing, or dressing an intravascular catheter.
   2. Palpation of the intended insertion site is not to be done after the application of antiseptic, unless aseptic technique is maintained.

E. Catheter selection and insertion
   1. Select the catheter, the insertion technique, and the insertion site with the lowest risk of complications (infectious and noninfectious) for the anticipated type and duration of IV therapy. Safety introducers and catheters should be used, as available, to prevent sharp injuries to healthcare workers.
   2. Health care providers who are trained and competent in the procedure may insert vascular catheters, (e.g., physicians, physician assistants, RN’s, LPN’s, and nuclear technicians). An experienced physician must supervise medical students. On an outpatient basis, qualified laboratory staff may insert peripheral IV catheters of two inches or less to maintain venous access for purposes of combining blood draw with chemotherapy, radiological procedures that require IV contrast injection, pediatric sedation and glucose tolerance testing.
   3. Aseptic technique must be maintained during central venous catheter insertion and must include the use of maximal sterile barrier precautions (sterile gloves, sterile
gown, large sterile drape, and mask). Peripheral arterial catheter insertion requires sterile gloves. Peripheral venous catheter insertion requires clean gloves.

4. Cutdown procedures, as a method to insert catheters, will not be routinely used.

5. Skin antisepsis. Disinfect clean skin with an aqueous 2% chlorhexidine gluconate (CHG) or a 1-2% tincture of chlorhexidine gluconate before catheter insertion. Allow the antiseptic to remain on the insertion site and dry before inserting the catheter.

6. The date and time of insertion must be written on the dressing and charted in patient’s record.

F. Catheter site dressing regimens
1. Transparent semi-permeable dressings are to be used on all venous and arterial catheters. If the patient is diaphoretic, or if the site is bleeding or oozing, a sterile gauze dressing may be needed.
2. The dressing must be replaced if it becomes wet, loosened, or visibly soiled.
3. Topical antibiotic ointment or creams are not used on insertion sites because of their potential to promote fungal infection and antimicrobial resistance.
4. Replacement of catheter site dressing will occur in accordance with Table I. The date and time of dressing change will be written on the dressing and charted in patient’s record.

G. Routine flushing of catheter lumens used on an intermittent basis will be done to maintain patency, using pre-filled syringe flush solutions provided by Pharmacy. (For protocol see UWHC Intranet; CRIT; Clinical Guidelines; Other UWHC Guidelines; “Flushing Venous Access Devices”).

H. Intravenous injection ports:
1. Minimize the risk of contamination by wiping the IV tubing access port with 70% alcohol before inserting a needless adapter or accessing the system.
2. Access the port only with sterile devices.
3. Cap all stopcocks and ports when not in use and strive to minimize the use of stopcocks.

I. Minimize leaks and breaks in the system.

J. Replacement of intravascular catheters
1. Replace all catheters inserted under emergency conditions* as soon as possible and no longer than within 48 hours (*when adherence to optimal aseptic technique cannot be ensured).
2. Do not routinely replace catheters solely for the purpose of reducing the risk of infection. (See Table I for replacement protocol)
3. Use clinical judgment to determine when to replace a catheter that could be a source of infection. For example, do not routinely replace catheters in patients whose only indication of infection is fever before ruling out other sources of infection (e.g., UTI, etc.). Venous catheters do not necessarily need to be replaced routinely in patients who are bacteremic or fungemic if the source of infection is judged not to be the catheter. (For more information see reference #2).
4. Remove the intravascular catheter if there is purulence at the insertion site. A notation will be made in the chart concerning local inflammation, pain, tenderness and the presence or absence of pus upon compression of the puncture site after removal of the catheter. Always inform the physician if purulence is expressed from the site. [See Section VI - Blood Cultures and Semi-quantitative Catheter Tip Cultures].
K. Hang time for parenteral fluids and blood products
   1. Complete the infusion of blood and other blood products within 4 hours of hanging.
   2. Complete the infusion of lipid emulsions alone (total lipids) within 12 hours of hanging, unless volume considerations require more time, but complete the infusion within 24-hours.
   3. Complete the infusion of other parenteral fluids (e.g., TPN, TNA, 3-in-1 admixtures) within 24 hours of hanging. A filter set will be used on all TNA fluids.
   4. Cyclic (non-continuous) TNA is changed every 24 hours and given new tubing and a new filter.
   5. If contaminated fluid is suspected, obtain blood cultures from the patient AND culture a sample of infusate from the IV bag and administration set, and save the suspect bag and administration set in a refrigerator. Notify Infection Control that this has been done as soon as feasibly possible.

L. Replacement of administration sets/tubing (See Table I)
   All IV tubing, including that used with a volumetric pump, will be routinely changed down to the catheter or extender every 72 hours. Use of extenders is encouraged to minimize manipulation of dressing during tubing change. Change needleless valves every 72 hours. Change filter sets for TNA every 72 hours. Exceptions are given below:
   • Replace tubing used to administer blood or blood products within 24 hours of initiating the infusion. More frequent changes may be necessary as debris collects on standard in-line filter and impedes flow.
   • Replace tubing used to administer lipid emulsions alone (total lipids) every 12-24 hours.
   • Replace tubing used to administer propofol infusions every 6-12 hours, depending on its use, per manufacturer’s recommendation.

M. Remove any intravascular catheter that is no longer essential for medical management.

N. Do not administer intranasal or systemic antimicrobial prophylaxis routinely before insertion or during use of an intravascular catheter as a method to prevent catheter colonization or bloodstream infections.

O. Do not submerge the catheter under water. Showering may be permitted if precautions can be taken to reduce the likelihood of introducing organisms into the catheter, e.g., the catheter, hubs and connecting device should be protected with an impermeable cover during the shower.

III. SPECIFIC RECOMMENDATIONS FOR CENTRAL VENOUS CATHETERS (INCLUDING PICC, HEMODIALYSIS, PULMONARY ARTERY) USED IN ADULT AND PEDIATRIC PATIENTS

A. Selection of catheter insertion site
   1. Weigh the risk and benefit of placing a device at a recommended site to reduce infectious complications against the risk of mechanical complication (e.g., pneumothorax, bleeding, subclavian artery puncture, subclavian vein laceration, subclavian vein stenosis, hemothorax, thrombosis, air embolism, catheter misplacement). Consideration of comfort, security, and maintenance of asepsis, as well as, patient-specific factors (e.g., preexisting catheters, anatomic deformity, bleeding diathesis) should also be included in site selection.
2. In adult patients, a subclavian vein is preferred to a jugular or a femoral site to minimize the risk of infection with non-tunneled central venous catheters.

3. Catheters used for hemodialysis or pheresis may be placed in a jugular or femoral vein rather than a subclavian vein, to avoid venous stenosis.

B. Use a central vascular catheter (CVC) with the minimum number of ports or lumens essential for the management of the patient.

C. Subcutaneous implanted ports are preferred for patients who require long-term intermittent vascular access. A PICC or tunneled CVC is preferable for patients requiring frequent or continuous access.

D. Hemodialysis catheters
   1. Use a cuffed CVC for dialysis if the period of temporary access is anticipated to be greater than 3 weeks.
   2. Use a fistula or graft instead of a CVC for permanent access for dialysis.
   3. Hemodialysis catheters are not used for blood drawing or applications other than hemodialysis except during dialysis or under emergency circumstances.

E. Central Vascular Catheter (CVC) Insertion
   1. Maximal barrier precautions and aseptic technique must be used for the insertion of CVCs (including PICCs or guidewire exchange). Maximal barrier precautions includes: mask, sterile gown, sterile gloves, and a large sterile drape.
   2. Use a sterile sleeve to protect pulmonary artery catheters during insertion.
   3. Skin antisepsis. Disinfect clean skin with an aqueous 2% chlorhexidine gluconate (CHG) or a 1-2% tincture of chlorhexidine gluconate before catheter insertion. Allow the antiseptic to remain on the insertion site and to dry before inserting the catheter.
   4. Place a chlorhexidine sponge (Biopatch®) around the exit site prior to applying the transparent dressing, with the following exceptions:
      • It is generally not necessary to use Biopatch® on tunneled CVCs or implanted ports, with exception of hemodialysis catheters.
      • Do not use Biopatch® in neonates less than 7 days old or if the gestational age is less than 26 weeks.
      • Biopatch® placement can be delayed if catheter exit site is oozing. When oozing has ceased, the Biopatch® should be applied.

F. Designate one port exclusively for TPN or TNA if a multi-lumen catheter is used to administer parenteral nutrition.

G. Antibiotic lock solutions
   1. Do not routinely use antibiotic lock solutions as a means of preventing catheter-related bloodstream infections.
   2. Antibiotic lock solutions are acceptable only in special circumstances, (e.g., a patient with a long-term cuffed or tunneled catheter or port who has a history of multiple catheter-related bloodstream infections despite maximal adherence to aseptic technique).

H. Central Venous Catheter Dressing Regimens
   1. Replace the transparent dressing if it becomes wet, loose, soiled or when definitive inspection of the site is necessary.
   2. Utilizing the hospital’s central line dressing change kit, replace the transparent dressing routinely every 6 days using sterile technique and a new Biopatch®. Dressings without Biopatch® will be replaced routinely every 3 days. Gauze dressings will be replaced routinely every 2-3 days. Exception: pediatric patients in
which the risk of dislodging the catheter outweighs the benefit of replacing the dressing.

3. Patients admitted with well-healed tunneled CVC sites do not routinely need a dressing, however the exit site should be covered while in the hospital. Biopatch® may be used if there are signs and symptoms of an exit site infection.

I. Replacement of CVC (including use of guidewire exchange)
   1. Do not routinely replace CVCs as a method to prevent catheter-related bloodstream infections.
   2. Do not remove CVCs or PICCs solely because there is fever. Use clinical judgment regarding appropriateness of removing the catheter if there is evidence of infection elsewhere or suspicion of a non-infectious cause of fever.
      • Local inflammation around catheter site may indicate that the catheter should be removed and tip cultured by semi-quantitative technique. (Exception: tunneled or cuffed catheters).
      • Replace any short-term CVC if there is purulence at the insertion site (i.e., exit site infection).
      • If the subcutaneous tunnel is obviously infected or the patient has not shown a satisfactory response to antimicrobial therapy within several days and the catheter is the probable cause of refractory bacteremia or fungemia, it must be removed.
   3. Exchanges of a CVC at the same site over a guidewire is generally discouraged, and should not be done unless there are limited sites for central access or the patient’s condition (e.g., morbid obesity, coagulopathy) would make insertion in a new site hazardous.
      • If there is need to replace a malfunctioning non-tunneled catheter, guidewire exchange at the same site may be used if there is no clinical suspicion of catheter-related infection.
      • The physician must use maximal barrier precautions and must change sterile gloves after removal of the old catheter and before insertion of the new.
      • The old catheter tip must be sent for culture if the line has been in place for ≥24 hours. If these cultures indicate the old catheter was infected, the new catheter must be removed from the infected site and access reestablished at a new, clean site.

J. CVCs may be removed only by a physician or registered nurse. Exception: Pulmonary artery catheters may only be removed by a physician or by a RN certified in their removal. Tunneled CVCs and implanted ports are only removed by physicians.
   • Note: Remove pulmonary artery introducers within 48 hours of removal of the pulmonary catheter.

K. Antiseptic-impregnated CVCs may be used in adults whose catheter is expected to remain in place >4 days if, after implementing a comprehensive strategy to reduce catheter-related bloodstream infection rates, the rate remains above the selected benchmark rate. The comprehensive strategy includes the following three components:
   1. Educating persons who insert and maintain catheters,
   2. Using maximal sterile barrier precautions, and
   3. Using a 1-2% chlorhexidine gluconate preparation for skin antisepsis during CVC insertion.
IV. SPECIFIC RECOMMENDATIONS FOR PERIPHERAL ARTERIAL CATHETERS & PRESSURE MONITORING DEVICES FOR ADULT AND PEDIATRIC PATIENTS

A. Arterial pressure monitoring should be used only when information gathered by this technique will clearly influence patient management.

B. Patients with indwelling arterial catheters may be placed only in ICU’s or intermediate care units. Exception: patients with arterial catheter used for perfusion of organs with chemotherapeutic agents.

C. The entire delivery system, including the tubing, continuous flow device and disposable transducer are routinely replaced at 96-hour intervals. Replace continuous flush device and solution at the same time.

D. Arterial catheter site care and dressing changes are performed routinely every 6 days using sterile technique, a transparent dressing AND a Biopatch® at the catheter exit site.

E. Keep all components of the pressure monitoring system sterile. Minimize, to the degree possible, the number of manipulations of and entries into the system.

F. Do not administer dextrose-containing solutions or parenteral nutrition fluids through the pressure monitoring circuit.

G. If there is need to replace a malfunctioning arterial catheter, guidewire exchange at the same site may be used if there is no clinical suspicion of catheter-related infection.
   - The procedure must be done with stringent aseptic technique and the physician must change sterile gloves after removal of the old catheter and before insertion of the new.
   - The old catheter tip must be sent for culture if the line has been in place for ≥ 24 hours. If these cultures indicate the old catheter was infected, the new catheter must be removed from the infected site and access reestablished at a new, clean site. Blood cultures are not needed for guidewire exchange of a malfunctioning arterial catheter.

V. SPECIFIC RECOMMENDATIONS FOR PERIPHERAL VENOUS CATHETERS (INCLUDING MIDLINE) IN ADULT AND PEDIATRIC PATIENTS

A. In adults, the upper extremity is preferred to the lower extremity for catheter insertion. Replace catheter inserted in a lower extremity site to an upper extremity site as soon as feasible. In pediatrics, less than one year old, the dorsum of the foot or scalp may be used as insertion site.

B. In adults, replace peripheral venous catheters at least every 72 hours to reduce risk of phlebitis. If there are limited sites for venous access and there is no evidence of phlebitis or infection, it is acceptable to leave the catheter in place for longer periods on a day-by-day basis. However, the insertion site must be closely monitored and site care must be done at least weekly.

C. In pediatric patients, peripheral venous catheters may be left in place until intravenous therapy is completed, unless a complication occurs. However, the insertion site must be closely monitored and site care must be done at least weekly.

D. Routine periodic site care is not required for peripheral venous catheters. Replace dressings more frequently in diaphoretic patients. Always replace the dressing if it becomes wet, loose or soiled.
VI. BLOOD CULTURES

Blood cultures should always be done if a patient receiving infusion therapy has signs of sepsis. (For protocol see UWHC Intranet; CRIT; Clinical Guidelines; Other UWHC Guidelines; “Blood Culture Guideline”).

A. Blood culture volume (10-20 ml per culture) is the single most important determinant for detecting bacteremia or fungemia in adults. For adults, a volume of 10 ml is the absolute minimum per culture. For infants and small children, obtain 1-5 ml per culture (absolute minimum of 1 ml per culture).

B. Two separate blood cultures must be drawn, ideally from peripheral veins by separate aseptic venipuncture, rather than obtaining blood through vascular catheters.

C. Paired cultures of blood, one drawn from the catheter and the other obtained percutaneously, are useful for the diagnosis of catheter-related bloodstream infection.

D. Only when peripheral veins are unavailable, both blood cultures may be drawn from the intravascular catheter, ideally separate catheters if the patient has more that one intravascular device.

E. Never collect a single blood culture from an adult.

F. Blood cultures should be drawn during a febrile episode, ideally before fever abates. If patient has endocarditis or catheter-related sepsis, blood cultures may be drawn any time.

G. Do not routinely culture vascular catheter tips unless concomitant blood cultures have been obtained as well.

VII. PROCEDURE FOR SEMI-QUANTITATIVE TIP CULTURES

A. Thoroughly cleanse skin about the insertion site with 70% alcohol and allow to dry.
B. Using sterile forceps, carefully withdraw the catheter keeping the externalized portion directed upward and away from the skin surface.
C. Procedure for obtaining tip varies with the length of the catheter.
   1. Shorter catheters (5.7 cm): Using sterile scissors, cut the catheter beginning a few millimeters inside the former skin-surface-catheter-interface.
   2. Longer catheters (20.3 cm and 60.9 cm): Two 5 cm to 7 cm segments are obtained. Using sterile scissors, a proximal segment is cut beginning a few millimeters inside the former skin-surface-catheter-interface; and also the tip segment is obtained.
D. Place each catheter segment in a sterile transport container, avoiding contact with the outside of container.
E. Inspect the catheter exit site and note if any purulence can be expelled.
F. If pus can be expelled from the catheter exit site, swab the drainage with a culturette swab and send to the laboratory requesting a routine wound culture. Label the source as: drainage from (location of) IV exit site, (e.g., drainage from Rt. IJ exit site).
G. Send the catheter segment(s) to the laboratory requesting a routine culture. Label the source as: location/type of IV catheter, (e.g., Rt. IJ Swan).

VIII. POLICY & PROCEDURE CROSS REFERENCES (Nursing Patient Care Procedures Manual)
1.11 Arterial Catheter: Insertion, Maintenance, Blood Drawing and Discontinuation
1.12 Removal of Pulmonary Artery (PA) Catheters in the Cardiothoracic Intensive Care Unit by Registered Nurses
1.13 Administration of Blood & Blood Components
1.14 Swan Ganz: Insertion, Maintenance, Blood Drawing and Discontinuation
1.15 Declotting Long-term Central Venous Catheter (Hickman, Groshong, etc.) and Implantable Ports
1.16 Use and Care of a Hickman-type Catheter (Hickman, Groshong)
1.18 Insertion and Care of Peripherally Inserted Central Catheter (PICC) Placed in DVI (Interventional Radiology)
1.19 Needle-free IV System (Application & Use Guidelines)
1.20 External Venous Access Device Phlebotomy Procedure and Use of Eclipse Blood Collection Needle
1.21 Insertion and Care of Central Venous Catheter
1.23 Continuous Peripheral Intravenous Therapy
1.24 Volumetric Infusion Pump Deltec 3000
1.25 Use of Vascular Implanted Ports (Ports and P.A.S. Ports)
1.26 Peripherally Inserted Midline Venous Catheters
1.27 Peripherally Inserted Central Venous Catheters (Bedside PICC Program)
1.28 Heparinization and Care of Hemodialysis/Apheresis Catheters between Hemodialysis Treatment in Hospitalized Patients
8.28 Delineation of Responsibilities for Arterial Puncture, Arterial Line Insertion and Acid Base Monitoring

BD3.27 (Laboratory Policy) Bacterial Blood Culture Collection

UWHC Health Facts for You on vascular catheter care

Medical Staff Bylaws (Medical Staff Office)

IX. REFERENCES

POLICY & PROCEDURE


X. COORDINATION

Sr. Administrative Sponsor: Sr. VP Nursing & Pt Care Services
Author: Medical Director Infection Control
Infection Control Practitioner
Review/Approval Committees:
Infection Control Committee
Nursing Patient Care and Procedures Committee
Nursing Administrative Council
UWHC Patient Care and Procedures Committee
Medical Board

Mary Schroth, M.D.         Donna Sollenberger
Chair, Patient Care and    President & CEO
Procedures Committee