
	The Johns Hopkins Hospital <b>Interdisciplinary Clinical Practice Manual</b> <b>Infection Control</b>	<i>Policy Number</i>	IFC035	
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## I. OBJECTIVES

This policy represents the minimal standard of care at JHH to reduce the risk of infectious and non-infectious complications in any patient on an adult care unit with a VAD. Unit-specific protocols may be more stringent than this policy provided the minimal standards are met and the policy has been approved by Hospital Epidemiology and Infection Control (HEIC).

## II. INDICATIONS FOR USE


- A. These standards apply to all adult patients with the following catheters, including, but not limited to:
1. Peripheral intravenous line (PIV)
  2. Single lumen, multi-lumen catheters; tunneled and non-tunneled, cuffed and un-cuffed.
  3. Implantable port
  4. Peripherally inserted central catheter (PICC)
  5. Arterial Catheter
  6. Dialysis or hemapheresis catheter

## III. DEFINITIONS


Assistant	The assistant monitors for safe insertion of the line, utilizing the Central Line Insertion Care Team Checklist, assists with supplies and equipment, and is expected to stop the procedure for any safety violations. An assistant can be a RN, LPN, Clinical Technician, or radiology technologist with specialized training (per unit standard), resident/intern or faculty physician, nurse practitioner, or physician assistant.
Defined Clinical Duties	Tasks designated to an individual who, by virtue of their delineated clinical privileges or job description, is allowed to insert and manage central lines.
High Risk Patients	<ol style="list-style-type: none"> <li>1. Patients with a history of previous difficulty in placing a line.</li> <li>2. Body mass index &gt; 30 or &lt; 20.</li> <li>3. History of thrombosis at intended insertion site.</li> <li>4. During current attempt at line placement, supervisor (or skilled operator) failed on greater than 3 attempts.</li> </ol>
Primary Operator	Authorized prescribers and PICC nurses who perform central line insertions as part of their defined clinical duties, who is the primary inserter.
Secondary Operator	Authorized prescribers and PICC nurses who perform central line insertions as part of their defined clinical duties, who is asked to assist in central line placement by the primary operator (e.g., primary operator has reached three attempts).
Supervisor	For adult patients, the supervisor is a physician who is a second year resident or above, or a nurse practitioner or physician assistant with competency and delineated clinical privileges to insert central VADs. The supervisor will supervise line placements as defined below in the Training and Competency section.

## IV. RESPONSIBILITY

- A. Authorized prescribers and PICC nurses who insert central VADs
1. Has defined clinical duties to insert central VADs (see definition above)
  2. Has completed training and has demonstrated competency prior to inserting a VAD

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3. Adheres to the standards and procedures delineated in this protocol.
  4. Selects catheter and site guided by careful consideration of the patient's medical condition, treatment modalities, duration of therapy needed, patient needs and activity level, types of infusions needed and complication risks. See Appendix B for algorithm for selecting most appropriate line.
  5. Obtains informed consent unless it is an emergency, which must be documented in the medical record.
  6. Selects appropriate insertion supplies.
  7. Reviews line(s) daily to determine if removal is indicated.
  8. Ensures that an assistant is present and that the assistant completes the Central Line Insertion Care Team Checklist.
- B. Authorized prescribers
1. Writes an order to insert a VAD that is not being inserted by a physician, nurse practitioner or physician assistant (e.g., PICC line, peripheral VAD).
  2. Where available, utilizes the staff of the specialized Vascular Access Team for inserting VADs, and drawing blood from central VAD.
  3. Reviews lines daily to determine if removal is indicated.
  4. Adheres to the standards and procedures delineated in the protocol.
- C. Nursing Staff Who Insert VADs (including PICC lines and Peripheral lines)
1. Has completed training and has demonstrated competency prior to inserting a VAD.
  2. If applicable, completes PICC training course that has been approved by the JHH PICC Team Managers (PICC Insertion only).
  3. Adheres to the standards and procedures delineated in the protocol.
  4. Ensures that an assistant is present and that the assistant completes the Central Line Insertion Care Team Checklist.
- D. Nursing Staff (RN, LPN, Clin Tech, Clin A) Who care for and/or Assist with Insertions of Central VADs
1. Has completed training upon hire, computer based learning; Johns Hopkins - Central Line-Associated Blood Stream Infections.
  2. Completes annually- Nursing Annual Updates.
  3. Monitors for the safe insertion of the line utilizing the Central Line Insertion Care Team Checklist.
- E. Supervisor
1. Supervises central line insertion procedures as defined below in the Training and Competency section.
  2. When indicated, confirms documentation of procedures performed successfully for medical staff who insert central VADs.
- F. Residency Training Program Directors
1. Ensures personnel competency and compliance with the policy.
  2. Assures completion of required training modules.
  3. Assures communication and education of policy requirements to applicable medical staff responsible for central line placement.
- G. Vascular Access Team (VAT)
1. Assists with insertion of central lines placed by the Line Team.
  2. Inserts PICC lines in adult non-oncology patients.
  3. Change dressings for PICC lines.
  4. Declots central lines when requested.
  5. Changes central parenteral nutrition (CPN) central line dressing and tubing in applicable areas (See Appendix I L for more information).
- H. Parental Enteral Support Service (PESS) (Non-Department of Oncology)
1. After consultation, determines the most appropriate line for CPN and home access.
  2. Performs discharge planning for patients with home infusion needs for the non-Oncology patients.
- I. Adult Oncology PICC Team
1. Responsible for PICC line placement in Adult Oncology.

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2. Assists Oncology RNs with care and maintenance of VADs.
  3. Completes PICC training course that has been approved by the JHH PICC Team Managers (PICC Insertion only)
  4. Adheres to the standards and procedures delineated in the protocol.
  5. Ensures that an assistant is present and that the assistant completes the Central Line Insertion Care Team Checklist.
- J. Interventional Radiology (IR)
1. When requested, by medical staff, IR will assist in central line placement for patients considered high risk for routine approach or for difficult access patients.
  2. Routinely places tunneled, cuffed central lines, and/or implanted ports in inpatients and outpatients.
  3. Routinely places outpatient PICCs.
- K. Department of Hospital Epidemiology and Infection Control (HEIC)
1. Recommends infection prevention strategies and acts as a resource for questions concerning infection control.
  2. Assists with the development of staff education in conjunction with appropriate disciplines.
  3. Reviews infection control implications of products associated with VAD insertion and maintenance.
  4. Performs surveillance for infections and calculates rates of infection.

## V. PROCEDURE


### A. TRAINING AND COMPETENCY

#### 1. CENTRAL LINE


- a. Authorized prescribers who perform femoral, subclavian, and internal jugular central lumen catheter insertions as part of their defined clinical duties shall complete the VAD training ([mylearning@JohnsHopkins](mailto:mylearning@JohnsHopkins)) upon initial appointment or upon reappointment if not previously completed.
  - i. Course #1: Strategies for Safe Care and Use of Vascular Access Devices:
    - Module #1: Prevention of Central Line Associated Blood Stream Infections (CLABSI)
    - Module #2: Catheter Types
  - ii. Course #2: Safe Insertion Strategies for Central Line and Arterial Line Catheters
- b. Housestaff, clinical fellows, Medical Staff without documented competency and non-physician credentialed staff (e.g., nurse practitioners, physicians assistants) who perform femoral, subclavian, and internal jugular central lumen catheter insertions as part of their defined clinical duties shall:
  - i. Perform a minimum of five fully supervised procedures in locations above the diaphragm (internal jugular or subclavian), five fully supervised procedures in locations below the diaphragm (femoral) and 3 rewires of existing central VADs in any location or population.
    - If rotating through both adult and pediatric services, 5 supervised procedures are required in locations above the diaphragm (internal jugular or subclavian) and 5 below the diaphragm (femoral), for each population.
    - If a physician successfully performs the 5 supervised lines in one body site, he/she can independently insert lines for that site only.
    - If a physician successfully performs 3 rewires, he/she can independently rewire a central VAD.
  - c. The supervisor must be a physician who is a second year resident or above or PA or NP with competency and delineated clinical privileges to insert central VADs.
    1. For patients less than 12 years See the [Pediatric VAD policy](#)
    2. Procedures performed by housestaff shall be documented by the operator and confirmed by the supervisor as having been performed successfully. This can be done via the e-Value program, or other acceptable documentation as defined by each residency program. Documentation must allow for the possibility that operators may be asked to show validation of the required competency procedures at any time.
  - d. Nurses, Physicians and other designated personnel who perform peripherally inserted central catheters (PICCs) as part of their defined clinical duties must:
    - i. Complete the [VAD training](#).

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- ii. Complete a PICC insertion with MST (Modified Seldinger Technique) and Ultrasound program.
      - iii. Complete a minimum of five, fully supervised, successful, procedures with ultrasound.
    - e. The supervisor for PICC insertions must be a PICC certified RN or second year resident or above or PA, NP with documented competency and delineated clinical privileges to insert PICC.
  2. PERIPHERAL LINE
    - a. Nurses, other designated nursing personnel who perform peripheral line insertions must complete the [Peripheral IV insertion Self-Learning packet](#).
    - b. Three successful insertions as outlined on the Peripheral Insertion Competency Checklist must be observed and supervised by another RN who has this delineated competency.
    - c. Successful insertions shall be documented on the Competency Checklist and maintained in the staff member's personnel file.
- B. GENERAL PRINCIPLES**
1. An authorized prescriber's order is required to insert or discontinue a VAD, if VAD is not being inserted or discontinued by a physician, nurse practitioner or physician assistant.
    - a. Prescriber should enter and discontinue maintenance orders specific to the catheter type for all VADs.
  2. ALL VADs placed under non-sterile conditions in emergent situations shall be removed as soon as it is medically feasible.
  3. Patients with a non-tunneled central VAD in place on admission shall have the site and tip location assessed and should be removed only if the site is infiltrated or infected. It shall be removed and a new central line inserted at another site within 24 hours.
  4. Patients with peripheral IVs in place on admission shall have the site assessed and if the date of insertion is not known then it shall be removed and a new line inserted at another site.
  5. Use of large-caliber temporary central VADs, such as introducers/sheath devices (e.g., Cordis, 14 gauge without integral extension), are limited to the ICU, IMC, ED, OR, PACU, IR ( exception: dialysis or hemapheresis catheters). These catheters shall be removed/replaced prior to transfer to general care areas.
    - a. Large caliber catheters are occasionally placed on the floor during emergencies before transfer to the ICU or OR.
  6. Perform hand hygiene in accordance with the [IFC001 Hand Hygiene Policy](#) . Perform hand hygiene immediately prior to and following VAD insertion, manipulation, maintenance and removal.
  7. Topical antibiotic ointment or cream shall not be used on vascular access sites.
  8. Chlorhexidine gluconate in 70% isopropyl alcohol is the antiseptic standard for central, arterial and peripheral VAD insertions and site care.
    - a. If the VAD site has excessive debris, cleanse skin with alcohol swabs prior to using Chlorhexidine gluconate 70% isopropyl alcohol.
    - b. If the patient has an allergy (note: mild skin burning or discomfort is not an allergy) to chlorhexidine, tincture of iodine shall be used.
      - i. Allow the antiseptic to fully dry (at least 30 seconds)
    - c. Povidone iodine shall be avoided for VAD skin prep unless the patient is allergic to alcohol based products such as Chlorhexidine gluconate 70% isopropyl alcohol or tincture of iodine.
      - i. If povidone iodine must be used, the skin shall first be de-fatted with soap and water, and then dried. The povidone iodine must be allowed to stay on the skin and dry for at least 2 minutes, to permit it to release the iodine required for disinfection.
    - d. If excess hair removal is needed at catheter insertion site use single use sterile scissors or disposable head surgical clippers only. Shaving can result in microabrasions which increase the risk of infection; therefore, it should be avoided.
  9. Stopcocks shall:
    - a. Only be used when it is necessary to balance a central VAD;

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- b. Not be hooked together;
  - c. Be capped when not in use.
10. To minimize the risk of contamination, manipulation/blood drawing from the VAD system shall be kept to an absolute minimum. Injection ports, hubs, and needleless connectors shall be scrubbed with a 70% alcohol swab for at least 10 seconds before accessing the system
  11. Unused ports shall be flushed, according to protocol, capped with needleless connector or sterile cap, and clamped (where a clamp is present on the VAD).
    - a. Exposure of the catheter hub increases the risk of infection and air embolism. Keep manipulation of any VAD hub during therapies or blood draws to a minimum by using needleless connectors when feasible.
    - b. Needleless connectors should be considered part of the tubing and should be changed with tubing changes. (see tubing management).
    - c. If Needleless connectors are not hooked up to tubing they shall be changed every 96 hours or PRN if they become occluded or if visible blood or debris is seen in or on connector.
    - d. Needleless connectors on central lines shall be changed prior to drawing blood cultures through the line.
    - e. If a VAD requires clamps per the manufacturer these clamps must be closed at all times when connecting and disconnecting syringes or tubing to the VAD to prevent air embolism.
  12. All connections shall be luer locked.
  13. A syringe barrel size of 10cc or greater shall be used to troubleshoot or flush any non-power VAD to avoid excessive pressure and possible rupture of catheter or dislodgement of clot. Forced flushing with a smaller barrel size syringe shall never be used to clear a VAD.
  14. Prior to administering medications through a VAD, check for blood return and remove lock (e.g. high concentrations of heparin 100 units per ml or greater) solution if present. Consider compatibility of drug infusing, or drug to be administered to determine if waste discard or flush is appropriate.
  15. On non-emergent lines, consultation with the CVIL/IRC shall be considered on patients who are high risk (see definition above).
  16. Patients with femoral line catheters (excluding patients with femoral arterial groin sheaths) may mobilize per authorized prescriber order. See reportable conditions for mobilization of patients with femoral lines. Reportable conditions related to mobilization of patients with femoral lines are those that did not exist prior to mobilization and must have occurred with respect to mobilization.
  17. Absolutely no procedures are permitted on any dialysis patient's vascular access extremity with a fistula. Place a sign over the patient's bed and chart indicating no procedures in affected extremity.
- C. **SITE AND CATHETER SELECTION:** For site and catheter selection guidelines see the following
1. Appendix E Peripheral Line, Care of the Patient with
  2. Appendix F PICC Line, Care of the Patient with
  3. Appendix G Short Term Central Venous Catheter, Care of the Patient with
  4. Appendix H Tunneled Central Venous Catheter or Implanted Port, Care of the Patient with
  5. Appendix I Hemodialysis Catheter, Care of the Patient with
  6. Appendix J Hemapheresis Catheter, Care of the Patient with
  7. Appendix L Peripheral Parenteral Nutrition (PPN)/Central Parenteral Nutrition (CPN).
- D. **VAD INSERTION**
1. **CENTRAL VADS**
    - a. An assistant is required to be at the bedside during insertion of all central VADs.
      - i. If the operator requires supervision for the procedure, an assistant in addition to the supervisor will be necessary. The supervisor may waive the assistant role if in their best judgment they are able to assume the role of the assistant and supervisor and shall be responsible for completing the Central Line Insertion Care Team Checklist.

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- ii. The assistant can be a RN, LPN, Clinical Technician, Clin A, radiology technologist with specialized training (per unit standard), resident/intern or fellow or faculty physician, nurse practitioner, or physician assistant with documented competency and delineated clinical privileges.
- iii. Medical and nursing students cannot fill the assistant role for VAD insertions.
- b. The assistant will help monitor for the safe insertion of the central line.
  - i. The Central Line Insertion Care Team Checklist (see Appendix C) shall be used to monitor for safety.
  - ii. The assistant will immediately notify the operator of any deviation from the critical steps (as defined by the Central Line Insertion Care Team Checklist), stop the procedure if necessary, and assure compliance before procedure can proceed. If there are any concerns related to insertion, the attending physician shall be called.
  - iii. The assistant shall place the completed Central Line Insertion Care Team Checklist in the patient's medical record after completion.
- c. For non-emergent line placements, obtain a second qualified operator after (3) unsuccessful sticks, as complication rates increase by 50% after this number of attempts.
- d. Sterile technique is required for central VAD insertions.
  - i. Perform hand hygiene in accordance with the [IFC001 Hand Hygiene policy](#). Perform hand hygiene immediately prior to and following VAD insertion, manipulation, maintenance and removal.
  - ii. A surgical hand scrub is required before insertion of tunneled catheters, implanted ports, and permanent dialysis or hemapheresis catheters.
- e. Except in acute, life threatening situations, the primary operator, supervisor and anyone in contact with or crossing the sterile field shall use full barrier precautions during central VAD insertion. (In an acute, life threatening situation, the assistant shall react to opportunities to apply full barrier precautions).
  - i. Full barrier includes:
    - Cap (scalp, beard, mustaches and sideburns shall be covered)
    - Surgical mask
    - Sterile gown
    - Sterile gloves
    - Large sterile patient drape to cover patient from head to toe and all bedrails
    - Eye protection (e.g., face shield)
  - ii. Sterile field includes:
    - patient's full body drape, sterile tray, ultrasound probe, and all equipment used for procedure
- f. Anyone in contact with or crossing the sterile field shall follow full barrier precautions as described above in item e.i. All others in the room, or entering it during the procedure, shall wear caps and surgical masks.
- g. For patients in multi-patient areas, surgical mask and cap are required in curtained area.
- h. See General Principles # 8 for antiseptic choices and use.
- i. The operator shall follow the prep procedure as follows: scrub back and forth with antiseptic for 30 seconds and then allow it to air dry before puncturing site. The operator shall not wipe, fan or blot area after prep. For groin prep the operator shall scrub back and forth with antiseptic for 2 minutes and allow it to air dry for 2 minutes before puncturing the site.
- j. Ultrasound guidance shall be used for all non-emergent internal jugular line placements when feasible (optional for subclavian and femoral line placement).
  - i. Sterile gel and sterile probe and cord cover shall be used.
- k. When possible during insertion and rewires of a central (subclavian or internal jugular) VAD or external jugular, the patient shall be placed in Trendelenburg position (head of bed less than 0 degrees). If Trendelenburg is not possible, place the patient in the supine position. If both Trendelenburg and supine patient positions are contraindicated (e.g., increased ICP), the physician placing the line will make this


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determination and will clearly explain the risks to the patient or consent designee and document these in the medical record.

- i. For femoral VADs and PICC insertions the patient shall be supine. For PICC patients who are unable to tolerate supine position obtain provider order to allow placement of PICC for non supine position.
- l. All central lines, including femoral, will be assessed for successful venous placement by transduced CVP, ABG, fluoroscopy, or estimated CVP by fluid column test during insertion to prevent accidental arterial line placement.
  - i. Unused ports of multilumen central catheters shall be aspirated, flushed, according to protocol, capped, and clamped.
- m. Confirmation of proper placement (catheter tip in distal portion of the superior vena cava or the SVC/atrial junction) by chest x-ray, fluoroscopy or CT is required for all central VADs, before using the line and before increasing fluids above 10 ml/hr. Confirmation shall be documented in provider order entry under the Central Line Confirmation Orderset. For troubleshooting tip location refer to [MDU016 IV Therapy: Troubleshooting/Dec clotting Central Venous Access Devices \(VAD\) in Adults](#) .
  - i. The VAD shall be flushed and capped, or kept open with a physiologic solution at 10 ml/hr or less, pending confirmation. In the case of CPN line placement, D10W may be infused at 10 ml/hr until placement is confirmed.
  - ii. In emergency situations or in the OR, proper placement may be judged based on hemodynamic assessment until a chest x-ray can be obtained.
- n. Patients admitted to the hospital with central VAD access (except dialysis or hemapheresis catheters) shall have tip location confirmed by chest x-ray, fluoroscopy or CT within 12 hours of admission. Confirmation shall be documented in provider order entry under the Central Line Confirmation Orderset.
  - i. If patient is a readmission within 7 days, has a chest xray in the medical record indicating proper placement and there are no assessment parameters indicating malposition, an admission chest xray to determine tip location is not necessary.
- o. All non-tunneled central VADs (except PICC lines) shall be sutured securely in place.
- p. PICCs shall be secured with a sutureless securement device unless medically contraindicated.
2. **ARTERIAL CATHETERS**
  - a. For radial or dorsalis pedis sites, create a sterile field using a medium sized fenestrated sterile drape. Person inserting arterial line shall wear sterile gloves, sterile gown and mask with face shield.
  - b. Femoral or axillary arterial catheters require maximum barrier precautions as with central VADs, including large sterile drape, sterile gloves, sterile gown, cap, and mask with face shield.
  - c. Arm with a PICC shall be avoided, if possible, but may be used for arterial catheter if clinically indicated.
3. **PERIPHERAL CATHETERS**
  - a. See Appendix E: Care of the Patient with a Peripheral Line .
  - b. External jugular (EJ) catheters are considered peripheral catheters but shall be placed by MD, PA or Nurse Practitioner. Patient shall be placed in Trendelenberg position for insertion.

## E. REMOVAL

1. **General**
  - a. Only personnel who have demonstrated competency may remove a VAD.
    - i. Registered nurses who have demonstrated competency may remove non-tunneled, non cuffed central venous catheters
    - ii. Registered nurses may not remove central arterial, non-tunneled or tunneled pheresis or dialysis catheters or other tunneled lines of any kind.
    - iii. An authorized prescriber's order is required to remove a VAD and to discontinue maintenance orders.
  - b. Refer to [Mosby's central venous removal procedure](#) for removal of nontunneled central venous catheters.

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2. Central VAD lines
  - a. If a central VAD is accidentally removed, pressure shall be applied to the site and a physician shall be notified as soon as possible.
  - b. During removal of a central (subclavian or internal jugular) VAD or external jugular VAD, it is imperative that the patient be placed in Trendelenburg position (HOB less than 0 degrees) in order to prevent air embolism. If the patient's condition contradicts this position (e.g., increased ICP), the physician removing the line will make this determination and will clearly explain the risks to the patient or consent designee and document these risks and conversation in the medical record.
    - i. For femoral VADs and PICC removals the patient shall be supine.
  - c. If there are signs of infiltration or infection at the insertion site or tunnel, or if the patient has a VAD-associated bacteremia, removing the catheter is most often indicated.
    - i. It is not recommended to routinely culture catheter hardware; however, if there is a strong suspicion of catheter infection and the organism is unknown the catheter tip can be cultured
    - ii. If the catheter is removed and culture is desired because infection is suspected, a 5 cm section including the tip is to be cut aseptically, and sent to Microbiology in a dry sterile container. Catheter hardware cultures shall always have an accompanying peripheral or line blood culture specimen sent within 24 hours to help validate the significance of any recoveries made from the hardware.
    - iii. Refer to JHH blood culture policy for instructions regarding [PAT063 Blood Cultures: Ordering, Procurement and Transport](#) :
  - d. Central VADs shall not be routinely exchanged. The need for access shall be reviewed daily and the catheter shall be removed as soon as central access is no longer needed.
  - e. The physician is responsible for removing femoral venous and arterial sheaths, and central lines in patients with a known bleeding diathesis (INR >1.3 or a PTT > 50 seconds, platelets < 50K, anti-Xa UFH level > 0.3, or anti-Xa LMWH level is > 0.6) Examples of thrombolytics/anticoagulants/platelet inhibitors include (but are not limited to) reteplase, heparin (both UFH and LMWH), enoxaparin, dabigatran, lepirudin, argatroban, bivalirudin, abciximab, eptifibatid, and tirofiban.
  - f. The Registered Nurse may remove central VAD for patients on anticoagulants for Venous Thromboembolism (VTE) Prophylaxis. The following are considered prophylactic dosing for VTE:

<b>Drug</b>	<b>Usual prophylaxis dose</b>
Heparin	5000 units SC q 8 hrs
Enoxaparin (Lovenox)	40 mg SC daily, OR 30 mg SC BID
Fondaparinux (Arixtra)	2.5 mg SC daily
Dalteparin	2500 units SC daily OR 5000 units SC daily

- g. The provider is responsible for scheduling removal of tunneled central catheters or implanted ports by appropriate personnel in preestablished locations (e.g. IR, OR).
3. PERIPHERAL LINES
    - a. See Appendix E: Care of the Patient with a peripheral line
    - b. External jugular (EJ) catheters are considered peripheral catheters. Patient shall be placed in Trendelenburg position for removal, unless medically contraindicated.
    - c. See Appendix A: Scope of Practice for Nursing Staff.

#### F. **REWIRES** – Central Lines

1. Central VAD catheter exchange over a guidewire is an acceptable technique for:
  - a. Replacing a malfunctioning catheter


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- b. Changing a multi-lumen to a single lumen catheter
- c. Exchanging a pulmonary artery catheter for a central venous catheter when invasive monitoring is no longer needed and there are no signs of line infection
- d. If the patient is clinically stable and CLABSI is suspected, guidewire exchange with catheter tip culture can be considered but is not generally recommended.
2. When possible during rewires of a central subclavian or internal jugular VAD, the patient shall be placed in Trendelenburg position (HOB less than 0 degrees). If Trendelenburg is not possible, place the patient in the supine position.
  - a. If the patient's condition contraindicates the Trendelenburg or supine position (e.g., increased ICP), the physician placing the line will make this determination and will clearly explain the risks to the patient or consent designee and document these in the medical record.
  - b. For femoral or PICCs, the patient shall be supine.
3. During re-wires, lumens or caps shall never be cut in order to place a guidewire or to assist with disinfection.
4. For rewires, all central VAD insertion guidelines shall be followed. An x-ray confirming proper tip location is required when rewiring large bore catheters (e.g., Cordis, Shiley, 14 gauge or larger Arrow). Smaller gauge catheter rewires (less than 14g) do not require x-ray, unless clinically indicated. Confirmation shall be documented in provider order entry under the Central Line Confirmation Orderset.
5. A new set of sterile gloves shall be worn prior to handling the new catheter. This can be accomplished by double gloving at the beginning of and/or using the assistant to help.
6. Whenever possible, a new administration set and fluid shall be used when a line is rewired/resited.

#### G. SITE AND LINE ASSESSMENT

1. Patients shall be encouraged to report any changes in their catheter site or any new discomfort to their healthcare provider.
2. Check for blood return prior to infusion at least every 12 hours or flush more frequently if the patient is receiving medication that is caustic to the vein.
3. Patients with a peripheral VAD in place on admission shall have the site assessed and if the date of insertion is not known or the site is infiltrated or infected, it shall be removed and a new line inserted at another site.
4. If a localized infection is suspected at the VAD insertion site or tunnel, the physician shall be informed and a bacterial and/or fungal culture of the site drainage may be obtained.
5. A nurse shall assess for signs of infiltration, phlebitis or infection; including pain, redness, swelling, induration, disruption of flow or lack of blood return and assess that VAD dressing is intact, occlusive and dry as follows:
  - a. VAD sites not in continuous use, at least daily.
  - b. VAD sites connected to a gravity volume controller/infusion pump, at least every 8 hours
  - c. VAD sites in use but not connected to a gravity volume controller/infusion pump at least every 2 hours
  - d. VAD sites may be required to be assessed more frequently if dictated by other protocols.
  - e. If gauze dressing is being utilized, assess for phlebitis and infection at time of dressing change.
  - f. Infiltration will be graded based on the following scale:

Grade	Scale/Characteristics
0	No Symptoms
1	<ul style="list-style-type: none"> <li>• +/- pain</li> <li>• skin blanched</li> <li>• cool to touch</li> </ul>

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	<ul style="list-style-type: none"> <li>• edema &lt;1 inch in any direction</li> </ul>
2	<ul style="list-style-type: none"> <li>• +/- pain</li> <li>• skin blanched</li> <li>• cool to touch</li> <li>• edema 1-6 inches in any direction</li> </ul>
3	<ul style="list-style-type: none"> <li>• mild - moderate pain</li> <li>• skin blanched, translucent</li> <li>• gross edema &gt;6 inches in any direction</li> <li>• cool to the touch</li> <li>• possible numbness</li> </ul>
4	<ul style="list-style-type: none"> <li>• skin blanched, translucent</li> <li>• skin tight leaking</li> <li>• skin discolored, bruised, swollen</li> <li>• gross edema &gt;6 inches in any direction</li> <li>• deep pitting edema</li> <li>• circulatory impairment</li> <li>• moderate severe pain</li> <li>• infiltration of any amount of blood product or vesicant</li> </ul>


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g. Phlebitis shall be graded based on the following criteria:

Grade	Critical Criteria
0	No symptoms
1	Erythema at access site with or without pain
2	Pain at access site with erythema and/or edema
3	Pain at access site with erythema and/or edema Streak formation Palpable venous cord
4	Pain at access site with erythema and/or edema Streak formation, Palpable venous cord > 1 inch in length Purulent drainage

#### H. TUBING MANAGEMENT


1. To minimize the risk of contamination, manipulation of the VAD system shall be kept to an absolute minimum.
2. Injection ports, hubs, and needleless connectors shall be cleaned scrubbed for at least 10 times with a 70% alcohol swab before accessing the system.
3. Whenever possible, a new administration set and fluid shall be used when a line is rewired/resited.

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4. Stopcocks shall only be used when it is necessary to balance a central VAD, and stopcocks shall not be hooked together. Stopcocks shall be capped when not in use.
5. Administration sets include the path from the spike of tubing entering the fluid container to the hub of the VAD. Infusion pump cassettes, transducers, y-connectors, filters, and needleless connectors are considered part of the administration set and therefore, shall be changed according to the tubing change guidelines. The catheter hub shall be scrubbed with an alcohol swab at least 10 times before attaching a new sterile needleless connector.
6. All continuous administration sets, shall be changed and labeled (with date hung and date/day due to be changed) no more frequently than 96 hours. Parenteral nutrition tubing (see Appendix L) and blood product tubing shall be changed per policy [PAT029 Blood and Blood Component Transfusion Policy](#).
7. For Propofol tubing change recommendations refer to [PAT023 Mechanically Ventilated Patient Receiving Drugs Classified as Anesthetics](#)
8. All Intermittent administration sets, that are disconnected from primary set between infusions, shall be changed and labeled every 24 hours.
  - a. A short extension tube may be connected to the catheter and may be considered a portion of the catheter to facilitate aseptic technique when changing administration sets.
9. All VAD administration set tubing shall be primed and inspected for the presence of air. Air shall be eliminated before tubing is connected to IV device.
  - a. For back priming technique, secondary medication administration refer to: [Mosby's Skills link -Back Priming](#)
10. Unused ports shall be flushed, according to protocol, capped with needleless connector (or sterile cap, and clamped (where a clamp is present on the VAD)).
  - a. Needleless connectors shall be changed at the same time as IV tubing according to the above guidelines. For hubs with needleless connectors not in use (e.g., outpatients) change every 96 hours.
11. All connections shall be luer locked.
12. If VAD tubing becomes disconnected, the connecting port shall be scrubbed with a 70% alcohol swab for at least 10 times and new tubing attached at the needleless connector.
13. An in-line filter shall be used for adult patients who have potential or proven central cardiac shunt and for medications specified by the physician or pharmacist. Refer to [JHH pharmacy chart](#) for a list of the drugs that need inline filter.

#### I. FLUIDS AND ADDITIVES

1. All continuous central VAD fluids shall be administered by infusion pump, except in the operating room, PACU, procedure areas and in emergency situations or when rapid fluid resuscitation is needed.
2. An infusion pump is recommended for peripheral IV fluids
3. Refer to departmental guidelines for a list of specific fluids or medications that require an infusion pump.
4. Keep vein open (KVO) rate for non-PICC catheters is 10 cc/hr.
5. A KVO rate of 20 cc/hr is recommended for PICCs.
6. KVO rate of 10 cc/hr through at least one lumen of non-tunneled (non-PICC) lines is required.
7. All catheters in oncology patients require a KVO rate of at least 10 cc/hr through each lumen (20 cc/hr for PICCs).
8. The distal port of multi-lumen central VADs shall be used for blood transfusions, colloid fluid, high volume fluid administration or CVP monitoring.
9. VAD fluid bags shall be changed no more frequently than every 96 hours. Pressure monitoring flush solutions which shall be changed as necessary, with a minimum of at least every 96 hours. See link for [CC602 Management of the Patient with an Arterial Line](#):
10. All fluid bags should be labeled with the date and time hung.
11. Staff adding medication to VAD fluids shall affix a label. Refer to the [PAT051 Medication Administration Management Policy](#), Appendix F, for medication labeling requirements. Do not write directly on the plastic fluid bags.


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- J. **DECLOTTING:** Dec clotting and troubleshooting information is addressed in the [MDU016 Troubleshooting/Dec clotting Central Venous Access Devices \(VAD\) in Adults](#).
- K. **DISCHARGE PLANNING**
1. Patients being discharged with a VAD shall have documented home care arrangements made prior to discharge or a continuum of care treatment plan documented.
    - a. The JHH Home Care Coordinator or Home Support Services, a branch of PESS, shall be notified prior to patient discharge, to assist with the discharge plan for home VAD Therapy.
    - b. The discharging nurse will teach the dressing/flush for the device with the plan for the home care nurse to review and reinforce the education at home.

## VI. REPORTABLE CONDITIONS

- A. Hospital Epidemiology and Infection Control (HEIC) will report catheter associated blood stream infections using National Nosocomial Infections Surveillance System (NNIS) definition.
- B. Reportable conditions related to this policy are as follows:

Reportable Conditions	Report to Authorized Prescriber	Complete PSN (F-8 IV Site Complications)
Absence of blood return in a central VAD unresolved after troubleshooting	+	+
Accidental removal	+	+
Breach of policy	+	+
Burning along the VAD tunnel while flushing or during infusion	+	
Complications during line placement (including but not limited to arterial puncture, suspected air embolism, pneumothorax, lost or retained wire, hematoma, inappropriate line placement)	+	+
Disconnect	+	+
Evidence of grade 2 or greater phlebitis	+	+
Excessive bleeding/drainage at the site	+	+
Infection	+	
Infiltration of vesicant drugs per Extravasation Policy	+	+
Leaking, or damaged catheter or equipment	+	+
Malpositioned central lines	+	
New or significant swelling/edema	+	
Pain or ringing in the ears while flushing or during infusion	+	
Persistent pain at the insertion site or in the shoulder on the same side of the VAD	+	
Resistance to flushing or infusion, distended veins on the same side as the VAD	+	
Suspected air or catheter embolism	+	+

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Suspected arterial placement	+	+
Suspected blood clot	+	
Unsecured VAD, (e.g., broken sutures, not sutured correctly)	+	+
Bleeding at line insertion site during or immediately after mobilizing a patient with a femoral catheter	+	+
Dislodgement or removal of a catheter due to mobilization	+	+
Malfunctioning of line after mobilization	+	+
Acute limb ischemia within 24 hours of mobilization in patients with femoral arterial lines	+	+


## **VII. DOCUMENTATION**

- A. The following require a written order per an authorized prescriber:
  1. Insert or discontinue a VAD, by a non-prescriber.
  2. Catheter maintenance orders (e.g. heparin flush, if indicated)
  3. Type of IV fluids and rate of administration
- B. VAD insertion shall be documented in the medical record using approved standard templates, including gauge and type of VAD, anatomical site, date and time of insertion, number of attempts, name of operator, and name of supervisor when indicated.
- C. Central line Insertion Care Team Checklist shall be completed and placed in medical record.
- D. Competency of the operator will be documented as required by:
  1. Each residency program and shall be viewable when requested at any time.
  2. Orientation and/or skills competency checklist for nursing staff.
- E. An authorized prescriber shall document confirmation of central VAD placement, including anatomical location, on the medical record using the central line placement confirmation order in Sunrise or in a note if electronic documentation is not available for that patient.
- F. Dressing changes shall be documented in the electronic medical record.
  - A. A nurse shall document VAD site assessment with each dressing change and as indicated in protocol.
- G. VAD flushes shall be documented on the Medication Administration Record (MAR).
- H. The nurse shall document initial implementation and ongoing adherence to the VAD protocol each day.
- I. Removal of VAD and site assessment at time of removal shall be documented in the electronic medical record.
- J. Reportable conditions, actions taken, and patient response shall be documented in the electronic medical record.

## **VIII. EDUCATION AND COMMUNICATION**

This policy shall be communicated to the appropriate JHH personnel via the following channels:

- A. Departmental Physician Advisors shall present the policy to their respective Performance Improvement Committees.
- B. The applicable Residency Training Program Director will communicate requirements for the documentation of the compliance with supervision requirements to any medical staff and affiliates responsible for central line placement
- C. Self-study slide presentations shall be completed by all housestaff, clinical fellows, attending physicians, NPs, PAs who insert central VADs.
  1. **Course #1: Strategies for Safe Care and Use of Vascular Access Devices:**
    - i. Module #1: Prevention of Central Line Associated Blood Stream Infections (CLABSI)
    - ii. Module #2: Catheter Types

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2. **Course #2:** Safe Insertion Strategies for Central Line and Arterial Line Catheters

- D. A self-study slide presentation shall be mandatory for all nursing personnel who care for central VADs.
- E. A self-study slide presentation shall be mandatory for all personnel who insert and/or supervise central VADs as listed above in #3.
- F. Educational materials (posters, nursing web-based applications, and in-service sessions) shall be used to communicate the policy.
- G. This policy will be placed in the [Interdisciplinary Clinical Practice Manual on the JHH Intranet site](#) Paper distributions will be made to the Functional Unit Nursing offices in the event of web access difficulty.
- H. Placement of policy online at [www.insidehopkinsmedicine.org/hpo](http://www.insidehopkinsmedicine.org/hpo)

## **IX. SUPPORTIVE INFORMATION**

**See Also:**

The Johns Hopkins Hospital Children's Center Pediatric Policies, Procedures and Protocols

The Johns Hopkins Hospital, Interdisciplinary Clinical Practice Manual

- A. [PAT029 Blood and Blood Component Transfusion Policy](#)
- B. [MDU003 Infiltration and Extravasation: Monitoring and Management of Vesicant and Non-vesicant Agents Policy](#)
- C. [IFC001 Hand Hygiene](#)
- D. [MDU016 Troubleshooting/Dec clotting a Central Venous Access Device \(VAD\) in Adults](#)
- E. [PAT063 Blood Cultures: Ordering, Procurement and Transport](#)


Removal of Central VAD Procedure Mosby's Online Procedures at: [Central Venous Catheter: Removal](#)

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- A. Camp-Sorrell, D. (Ed.). (2011). Access device guidelines: Recommendations for nursing practice and education. Pittsburgh: Oncology Nursing Press Inc.
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- D. National Kidney Foundation Inc. (2006). Clinical practice guidelines for vascular access.
- E. Rosenthal, K. (2003). Consider alternative technologies to maintain vascular access devices. Nursing Management, 34(8), 53-56.

**Developers:**

- Hospital Epidemiology and Infection Control Department
- JHH Vascular Access Device Committee
- Department of Nursing

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**Date:**\_\_\_\_\_  
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