

Intravenous Catheter Complications

Complication	Predisposing Factors	Signs/ Symptoms	Interventions	Prevention
<u>Vascular Access Device-Related Infection</u>	<ul style="list-style-type: none"> • Inadequate skin antisepsis prior to VAD insertion • Multiple manipulations of infusion delivery system • Patient age, condition, acuity • Presence of secondary infection • Inadequate care and maintenance practice 	Acute onset of fever, chills, and hypotension. No other apparent source of infection but the catheter	<ul style="list-style-type: none"> • Notify Prescriber immediately • Obtain blood cultures from device and from a separate peripheral vascular access site, as ordered. • Anticipate initiation of parenteral anti-infective therapy as ordered • If unsuccessful in treating suspected infusion-related infection, VAD may need to be removed 	<ul style="list-style-type: none"> • Perform hand hygiene prior to placing and before providing any VAD-related interventions • Use chlorhexidine for skin antisepsis prior to CVAD insertion; it is the preferred skin antiseptic • Perform skin antisepsis prior to peripheral catheter insertion using an antiseptic solution • Disinfect needleless connectors prior to access • Maintain aseptic technique during all infusion therapy administrations and VAD care • Change administration set and any add-on devices at recommended intervals • Minimize use of add-on devices • Remove VAD when no longer needed • Teach patients/caregivers who will self manage their VAD/infusions: hand hygiene, aseptic technique, disinfection of needleless connectors
<u>Catheter Exit Site Infection</u>	<ul style="list-style-type: none"> • Inadequate skin antisepsis prior to VAD insertion • Multiple manipulations of infusion delivery system 	Tenderness, erythema within 2 cm of catheter-skin junction, induration within 2 cm of catheter-skin junction, purulence at exit site	<ul style="list-style-type: none"> • Notify provider of signs and symptoms • Obtain order to culture purulent exudates 	<ul style="list-style-type: none"> • See prevention for Vascular Access Device-Related Infection

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	<ul style="list-style-type: none"> • Patient age, condition, acuity • Presence of secondary infection • Inadequate care and maintenance practice 			
<u>Port-Pocket or Tunnel-Tract Infection</u>	<ul style="list-style-type: none"> • Inadequate skin antisepsis prior to VAD access or insertion • Multiple manipulations of infusion delivery system • Patient age, condition, acuity • Presence of secondary infection • Inadequate care and maintenance practice 	<p>Erythema, necrosis of skin over reservoir of implanted port, tenderness, induration, purulent exudates from needle access site</p> <p>Purulent exudates from subcutaneous port pocket</p>	<ul style="list-style-type: none"> • Notify Provider of signs and symptoms • Anticipate removal of device 	<ul style="list-style-type: none"> • See prevention for Vascular Access Device-Related Infection
<p><u>Venous Air Embolism:</u> A bolus of air within the venous circulation.</p>	<ul style="list-style-type: none"> • break in catheter connection • open damage to hub or catheter body • after removal of catheter due to remaining subcutaneous tract 	<p>may be nonspecific: dizziness, fainting, cyanosis, tachycardia, hypoxic symptoms</p> <p>cardiovascular collapse, chest pain, shoulder/back pain</p>	<ul style="list-style-type: none"> • prompt recognition and immediate action by nurse, patient, caregiver • clamp catheter • place patient on left side and head lower than feet • call 911 and notify prescriber 	<ul style="list-style-type: none"> • Use luer lock connections, tape; use air eliminating filter on all administration sets when appropriate. • clamp catheter during any manipulations • have patient use Valsalva maneuver or hold breath during injection cap changes or tubing changes • apply occlusive pressure dressing after CVC removal (24-72 hours) • prime air out of all syringes/tubing prior to use

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				<ul style="list-style-type: none"> • anchor catheter securely • patient/caregiver education • supine position and Valsalva maneuver during CVAD removal
<u>Catheter Embolus/Rupture:</u> The catheter is sheared or damaged and then enters the bloodstream	<ul style="list-style-type: none"> • use of syringes smaller than 10cc to irrigate an occluded catheter • use of scissors or other sharp instruments during CVC dressing change • see Pinch Off Syndrome • poor catheter stabilization 	fluid leakage from the insertion site, cardiopulmonary signs and symptoms, (e.g., palpitations, shortness of breath, cardiac arrhythmias)	Catheter removal/retrieval by surgical or radiologic interventions	<ul style="list-style-type: none"> • patient/caregiver education • appropriate syringe size for catheter irrigation • no sharp objects near the catheter
<u>Catheter Malposition/Migration:</u> Incorrect placement of the catheter tip	<ul style="list-style-type: none"> • insertion site • patient anatomy or growth • significant change in thoracic pressure (coughing or vomiting) • body movements 	might be asymptomatic, inadequate blood return, pain upon infusion, leaking at insertion site, palpitations, dysrhythmias, patient reports “hearing” the infusion	<ul style="list-style-type: none"> • if asymptomatic, intervention might not be necessary • Notify Prescriber • CXR to verify tip position • Interventional Radiologist to reposition with guidewire • assess therapy to be infused for compatibility in peripheral venous access • remove and replace catheter 	<ul style="list-style-type: none"> • secure catheter to prevent migration • measure external catheter length with each dressing change

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<u>Catheter-related Thrombosis:</u> The formation, development or existence of a blood clot or thrombus related to the presence of an intravenous catheter within the vascular system	<ul style="list-style-type: none">duration of indwelling catheterizationCatheter material, diameter, and number of lumensCoagulopathiessluggish flow through vesselsrepeated use of a vein	Partial occlusion: signs and symptoms may be subtle and delayed - poor catheter function, withdrawal, pump alarm for occlusion, insertion site edema. Complete occlusion: unable to flush, prominent superficial collateral veins, neck pain, numbness or tingling in ipsilateral extremity, change in skin temperature or color, swelling in ipsilateral arm, neck or face, pain along vein, fever, malaise, tachycardia		Notify Provider; orders may include <ul style="list-style-type: none">Arrange for diagnostic study, i.e. venography, ultrasonography,remove catheterInitiate anticoagulant therapy or thrombolytic therapywarm compresses to affected area	<ul style="list-style-type: none">Remove catheters when no longer neededSecure cathetersmaintain IV flow – flush regularlymaintain optimum patient hydrationutilize routine flushing proceduresutilize smallest gauge catheter necessary to safely administer the therapyinsure placement of CVAD tip in SVC									
<u>Phlebitis:</u> Inflammation of a vein <u>Chemical Phlebitis:</u> a response of the vein intima to certain chemicals infused into or placed within the vascular system. <u>Mechanical Phlebitis:</u> Phlebitis associated with the placement of a cannula including: <ul style="list-style-type: none">Cannula’s placed in flexion areas; too large of a cannula in a small vein;	<ul style="list-style-type: none">Large gauge and length of catheterInadequate VAD insertion techniqueincorrect anatomic site of cannulationExtended dwell timeInadequate care and maintenance practicesInadequate skin antisepsisproperties and character of infusatehost factors such as age and presence of disease	<table><tr><th>Severity Score</th><th>Assessment Findings</th></tr><tr><td>0 - No symptoms</td><td></td></tr><tr><td>1 - Erythema at access site with or without pain</td><td></td></tr><tr><td>2 - Pain at access site with erythema and/or edema</td><td></td></tr><tr><td>3 - Pain at access site with erythema and/or edema; streak</td><td></td></tr></table>	Severity Score	Assessment Findings	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		Notify Provider <ul style="list-style-type: none">Discontinue infusion and remove catheter if orderedDetermine the potential cause of the phlebitisApply thermal compress to phlebitis area for 20 minute intervals, 3-4 times per day if ordered	<ul style="list-style-type: none">use of recommended solutions or diluents when mixing medicationsdilution of known irritating medications to the greatest extent possibleadministration of medications or solutions at the minimal rate recommendedrotation of peripheral sites at recommended intervalsuse of large veins for administration of hypertonic or acidic solutions to provide greater hemodilutionuse of the smallest-gauge
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<p>cannula's poorly secured, traumatic insertion of cannula</p> <ul style="list-style-type: none"> May occur up to 10 days post cannula placement <p>Bacterial Phlebitis: An inflammation of the intima of the vein that is associated with a bacterial infection.</p> <p>Post Infusion Phlebitis: Not evident until after intravenous solution or medications has been terminated and the cannula removed, usually within 48 hours of cannula removal. This may be a precursor to infection.</p>	<ul style="list-style-type: none"> irritation of the vein secondary to patient movement 	<div>formation; palpable venous cord</div> <div>4 - Pain at access site with erythema and/or edema; streak formation; palpable venous cord > 1 inch in length; purulent drainage</div>		<p>cannula that will adequately deliver the ordered therapy</p> <ul style="list-style-type: none"> excellent aseptic technique securely taped cannula's site observation to notice early signs of phlebitis patient/caregiver education regarding care and maintenance,
<p>Infiltration: The inadvertent administration of a non-vesicant solution, medication or both, into surrounding tissues</p>	<ul style="list-style-type: none"> break in a CVC under the skin Patient age, condition, acuity multiple manipulations size, length, and placement of PIV/CVAD infusion history Extended dwell time Inadequate care and 	<p>Feeling of skin tightness at the venipuncture site or catheter tip, blanching and coolness of the skin, tenderness or discomfort, the presence or absence of a blood return does not determine an infiltration</p>	<ul style="list-style-type: none"> Measure the degree of infiltration using INS infiltration scale. stop the infusion and remove cannula (peripheral only) notify prescriber if suspected central venous catheter infiltration for possible diagnostic 	<ul style="list-style-type: none"> patient/caregiver education regarding early recognition of signs/symptoms of infiltration patient and access device assessment

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	<p>maintenance practices</p> <ul style="list-style-type: none">• Failure to stabilize VAD adequately		<p>studies to determine cause and corrective action</p> <ul style="list-style-type: none">• isotonic solutions: warm compresses to help alleviate the discomfort and help absorb the infiltration if ordered• irritants (potassium chloride): use cold compresses if ordered• elevate the involved extremity to improve circulation and to help in the absorption of infiltration fluid• if weeping of the tissue occurs, loosely apply a sterile dressing if ordered• replace a peripheral cannula in the opposite extremity or in site above and away from the previous site	
<p>Extravasation: The inadvertent administration of a vesicant solution and/or medication into the surrounding tissues. A vesicant solution is a</p>				

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solution or medication that causes the formation of blisters, with subsequent sloughing of tissues occurring from tissue necrosis				
Occluded Venous Catheters: Complete or partial obstruction of a catheter	<ul style="list-style-type: none"> traumatic insertion of CVC long-term central venous catheters patient with a history of clotting problems incompatible solutions or medications leading to precipitate formation long -term TPN (lipid) infusions catheter movement/position occluded portacath needles 	Difficult or unable to flush catheter; onset may be insidious with symptoms of a fibrin sheath; can lead to a superior vena cava syndrome with: (prominent venous pattern over the chest; jugular, temporal and arm veins are engorged and distended; edema of the upper body. Late symptoms: dyspnea, cough, unilateral edema, cyanosis of face, neck, shoulder and arms, decreased level of consciousness)	<ul style="list-style-type: none"> notify prescriber Use of medication or chemical agent to restore patency if ordered radiographic studies to determine diagnosis if attempts to restore catheter patency fail as ordered the catheter may or may not be removed initiation of anti-coagulation therapy or thrombolytic therapy, as ordered 	<ul style="list-style-type: none"> correct any signs of mechanical obstruction, i.e., repositioning, tight, restraining clothing, etc. consider anti-coagulants with long-term therapies and especially patients with a history of clotting problems complete patient assessments including characteristics of CVC function compliance to flushing protocol for catheter maintenance use inline filter as appropriate
“Pinch-Off” Syndrome: Catheter pinch-off syndrome occurs when a central venous catheter inserted via the percutaneous subclavian site is compressed by the	<ul style="list-style-type: none"> Catheter is placed too medially in the chest 	Early: medication/solution will not infuse unless patient changes position, difficulty drawing blood samples from CVC, frequent pump alarms with occlusion or high pressure. After catheter embolism:	<ul style="list-style-type: none"> STOP the infusion radiographic studies to determine diagnosis as ordered surgical/radiologic intervention to remove catheter 	<ul style="list-style-type: none"> thorough patient assessment including characteristics of CVC function

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clavicle and the first rib. This syndrome results in an intermittent mechanical occlusion of the catheter. Pinch-off syndrome can result in complete or partial catheter transection and catheter embolization into the central venous system. This syndrome may occur with an implanted venous port or an external tunneled venous catheter.		may or may not have a blood return, swelling, pain at the clavicle with the administration of medication.		