

CARE PRACTICE	BUNDLE RECOMMENDATIONS
Hand Hygiene	Hand hygiene performed before and after CVC care and catheter entry or after contact with any inanimate object (IC) Use clean gloves for all CVC access (IC) Glove use does not preclude use for hand hygiene
Surface Disinfection	Clean work surfaces with a hospital-grade, EPA approved disinfectant prior to CVC care
Use of Maintenance Kits or CVC Carts	Procedure kits or carts containing supplies help to ensure all required supplies are available at the time of the procedure, including those required for dressing change, needleless connector change, and CVC removal (IC)
ASSESSMENT	BUNDLE RECOMMENDATIONS
Daily Assessment of Catheter Site	Inspect catheter site for cleanliness and dressing integrity Assess CVC site for complications (IC)
Daily Assessment of Need for CVC	Consult with medical provider daily regarding ongoing need for CVC in hospitalized patients (IC) Promptly remove unnecessary CVCs (IC) Assess patient for appropriateness of their vascular access device based on type/length of therapy and available vessels
CATHETER SITE CARE	BUNDLE RECOMMENDATIONS
Skin Antisepsis	Use chlorhexidine gluconate/alcohol combination solution for site antisepsis. Apply using a repeated back and forth motion with friction per the manufacturer's recommendations, allow to dry completely prior to applying dressing (IA) For patients with alcohol or chlorhexidine allergy or sensitivity, consider use of povidone iodine (II). Allow to dry completely prior to applying dressing (IB) For patients with compromised skin integrity or < 2 months of age, dried povidone iodine can be removed with normal saline wipes or sterile water (IC) Chlorhexidine gluconate/alcohol combination solution is currently not labeled for patients < 2 months of age for skin antisepsis although there is evolving evidence of chlorhexidine safety and efficacy for all age groups
CVC Dressing Assessment and Change	Routine dressing changes performed by clinicians with demonstrated competency (II) Dressing change frequency: <ul style="list-style-type: none"> <li>Transparent dressing: Change CVC dressing every 7 days or as needed</li> <li>Gauze and tape dressing: Change CVC dressing every 48 hours or as needed</li> </ul> Dressing should be changed if moisture, drainage or blood is present regardless of dressing type (IC)
Use of a Catheter Securement Device	Consider use of a catheter securement device prior to applying CVC dressing (IB) Replace securement device at least every 7 days with routine dressing changes or in the presence of drainage or blood and if integrity is compromised
Use of an Antimicrobial Product at CVC Insertion Site	There is current evidence to consider an antimicrobial impregnated dressing or disk at the catheter insertion site to decrease skin microbial counts (IB). A chlorhexidine product (impregnated dressing or disk) at the insertion site provides continuous release of chlorhexidine. Disinfect CVC insertion site with chlorhexidine gluconate/alcohol combination prior to applying antimicrobial product. Replace antimicrobial product per manufacturer's recommendation.
Daily bathing with chlorhexidine gluconate solutions	For critically ill pediatric patients with a CVC, consider daily bathing with chlorhexidine gluconate solution washcloths to reduce colonization (IB) Excludes head, mucous membranes, and non-intact skin

CATHETER MANAGEMENT	BUNDLE RECOMMENDATIONS
Use of Needleless Connectors	Utilize a needleless connector at CVC hubs and stopcocks (II) Minimize the use of stopcocks. If a stopcock is used, cap port(s) with a needleless connector and disinfect prior to use Educate clinicians on appropriate use of needleless connectors per manufacturer's guidelines Consider use of a closed system for infusion, medication administration, and blood withdrawal (IB)
Antisepsis of Needleless Connectors and Catheter Hub	Vigorously scrub needleless connector (diaphragm and sides) prior to entry with alcohol or chlorhexidine gluconate /alcohol combination using friction for a minimum of 15 seconds or manufacturer's guidelines and allow to dry completely (IB) Clean junctions e.g. needleless connector attached to catheter lumen or between IV tubing and needleless connector, prior to opening system with alcohol or chlorhexidine gluconate/alcohol using friction for a minimum of 15 seconds or manufacturer's guidelines and allow to dry completely (IB) Organizational CVC policies to address consistent practice for antisepsis of needleless connectors (IC)
Needleless Connectors and Administration Set Change	Administration set change: <ul style="list-style-type: none"> <li>TPN with lipids (3 in 1 solutions), lipids, and blood administration sets every 24 hours (IC)</li> <li>Propofol infusions, replace administrative sets every 6 -12 hours, depending on its use or manufacturer's recommendations (IC)</li> <li>Intermittent administration sets every 24 hours (IC)</li> <li>Continuous administration sets a minimum of 72 hours up to 96 hours (IA). Considerations for optimal time intervals include number of times device is being accessed and strict adherence to needleless connector and hub disinfection</li> </ul> Needleless connector change: <ul style="list-style-type: none"> <li>For capped CVCs, change no more frequently than every 72 hours (IC)</li> <li>For infusing CVCs, at least as frequently as the administration set (II)</li> <li>Change needleless connector if residual blood remains in needleless connector after blood administration or blood sampling</li> </ul> Assemble administration sets consistently for each type of CVC or therapy using aseptic or sterile technique For multi-lumen CVCs, dedicated lumen for TPN (II)
Blood Sampling from CVC	Consolidate CVC blood sampling to minimize catheter entry (IC) Flush all needleless connectors and stopcocks of visible blood
CVC Flushing Practices	Flush CVCs using prefilled, single use syringes Assess patency of CVC prior to use (IC) Flush protocol is based on the particular type and size of CVC (II) PICCs: <ul style="list-style-type: none"> <li>1.9Fr or 2Fr: 1mL heparinized saline (10u/mL) every 6 hours</li> <li>2.6Fr or larger: 2-3mL heparinized saline (10u/mL) every 12 hours</li> </ul> Tunneled/Non-tunneled CVCs: <ul style="list-style-type: none"> <li>2mL heparinized saline (10u-100 u/mL) every 24 hours</li> </ul> Ports: <ul style="list-style-type: none"> <li>Daily 3 -5mL heparinized saline (10u/mL)</li> <li>Monthly 3-5mL heparinized saline (100u/mL)</li> </ul>
Management of Occluded CVCs	For an occluded CVC, assess further to rule out a nonthrombotic occlusion For thrombotic occlusions, consider treatment with a thrombolytic (IA) For a suspected precipitate occlusion, consider treatment with a clearing agent (IC)
Use of Antimicrobial or Antibiotic Coated Catheters	Consider use of antimicrobial or antibiotic coated CVC in high risk patients (IB) High risk patients defined as those: <ul style="list-style-type: none"> <li>In critical care units</li> <li>Receiving Total Parenteral Nutrition</li> <li>Previous history of CRBSI</li> <li>With multiple vascular access devices (CVCs, arterial lines)</li> <li>With limited veins for future vascular access devices</li> </ul>
Replacement of CVCs	Do not routinely exchange CVCs as a means of preventing CRBSI (IA)

ADMINISTRATIVE	BUNDLE RECOMMENDATIONS
Education	Education of clinicians responsible for managing central lines should include: <ul style="list-style-type: none"> <li>Care and maintenance strategies</li> <li>Identification and management of complications (IC)</li> </ul> Initial and ongoing competencies for catheter care should be monitored (II) Educate clinicians on the benefits and use of the catheter maintenance checklist Administrative support for infection prevention efforts should minimally include: <ul style="list-style-type: none"> <li>Oversight of educational efforts and competencies</li> <li>Revision of policies and procedures based on evidence-based practice</li> <li>Implementation of checklists</li> <li>Review of unit specific CVC outcome data (e.g. CRBSI rates, posting days since last CRBSI)</li> <li>Celebrate successes</li> </ul>
Development of Specialty Teams or Competent Trained Clinicians for Catheter Maintenance Activities	Specialized teams for performing CVC maintenance e.g. dressing change, infusion tubing change, catheter clearance, and catheter repair (IA) Educational competencies for all aspects of catheter maintenance and care and identification and management of complications (IC)
Routine Surveillance of CVCs and Other Vascular Access Devices and Procedures	Collect and benchmark outcome data with National Healthcare Safety Network (NHSN) (IC) <ul style="list-style-type: none"> <li>Report comparisons based on historical data and NHSN</li> <li>Surveillance of other vascular access devices e.g. peripheral arterial catheters as these devices have shown to be a relative risk factor for increased CRBSI rates (IB)</li> </ul>
Development of a Process Improvement Plan for CVC Use	Utilize checklist for catheter care (IC) and maintenance activities. <ul style="list-style-type: none"> <li>Ensure clinical observers are skilled in monitoring for elements of sterile technique and CVC maintenance procedures</li> <li>Empower staff to stop procedure if sterile or aseptic technique is not followed</li> </ul> Root Cause Analysis for confirmed CRBSIs <ul style="list-style-type: none"> <li>Identify potential factors for process improvement</li> </ul> Perform surveillance or processes: <ul style="list-style-type: none"> <li>Hand hygiene</li> <li>Sterile or aseptic technique</li> <li>Proper skin disinfectant and application</li> <li>Catheter access technique</li> <li>Infusion tubing change technique</li> <li>Dressing change technique</li> <li>Compliance of maintenance bundle if patient transferred to another unit</li> <li>Monitor complication rates</li> </ul>

The CDC/HICPAC system for categorizing recommendations is as follows:

**Category IA.** Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies.

**Category IB.** Strongly recommended for implementation and supported by some experimental, clinical, or epidemiologic studies, and a strong theoretical rationale.

**Category IC.** Required by state or federal regulations, rules, or standards.

**Category II.** Suggested for implementation and supported by suggestive clinical or epidemiologic studies or a theoretical rationale.

**Unresolved issue.** Represents an unresolved issue for which evidence is insufficient or no consensus regarding efficacy exists.

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