# Central Venous Access Devise (CVAD): Care Management II

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Kulliyyah of Nursing
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# Infusion Therapy Standards of Practice


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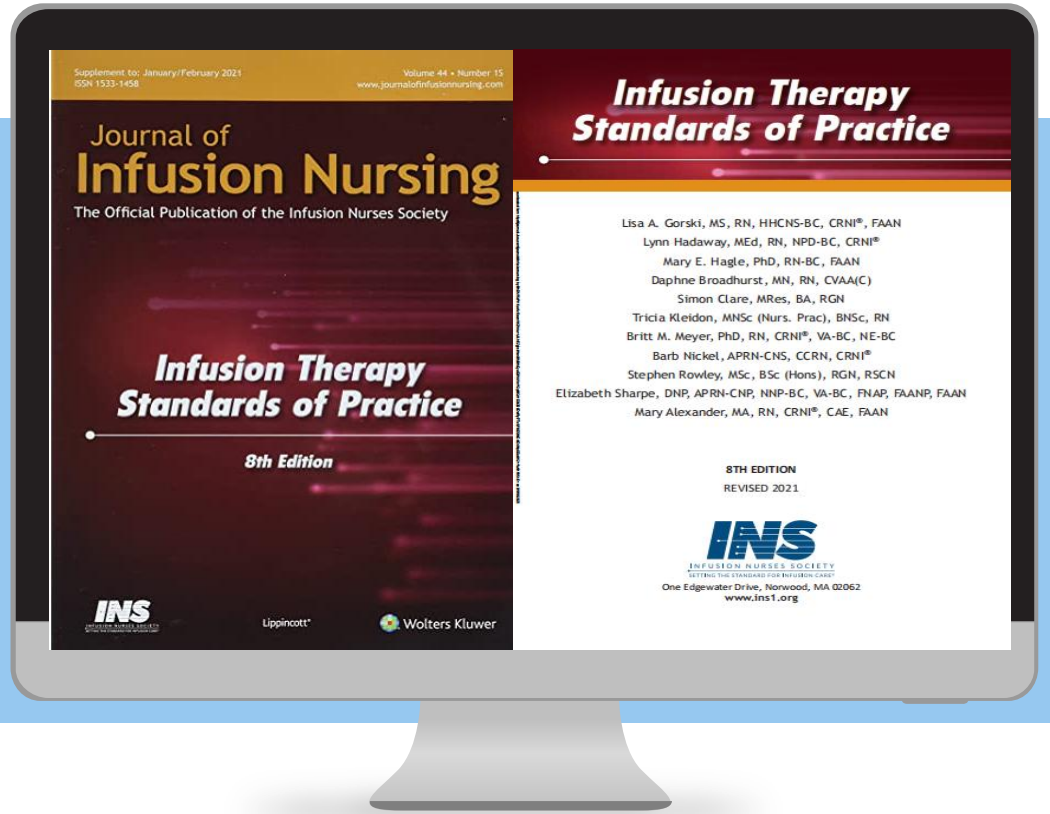
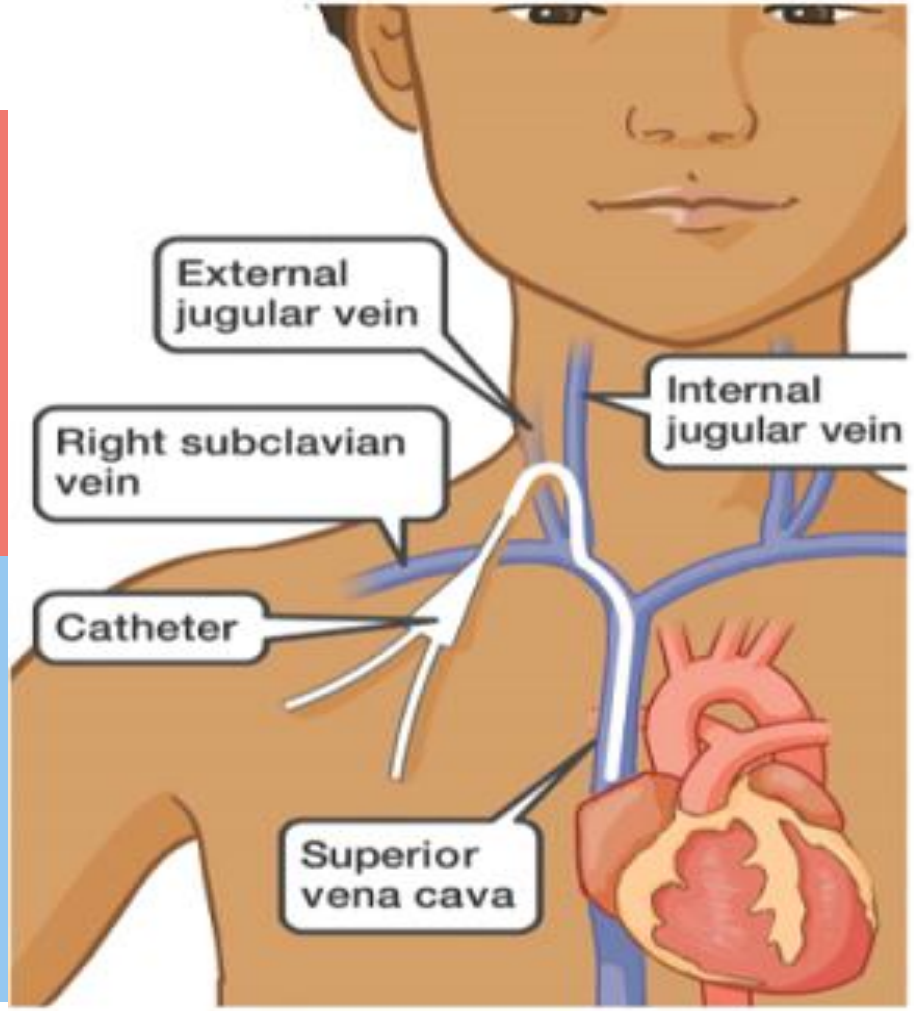


# Central Venous Access Device (CVAD)

✓Central Venous Access Device (CVAD) are inserted into the body through a vein to enable the administration of fluids, blood products, medication and other therapies to the bloodstream.

✓CVAD can be inserted into the subclavian or jugular vein (implanted ports, tunneled catheters), or can be inserted into one of the peripheral veins of the upper extremities, called peripherally inserted central catheters (PICCs).

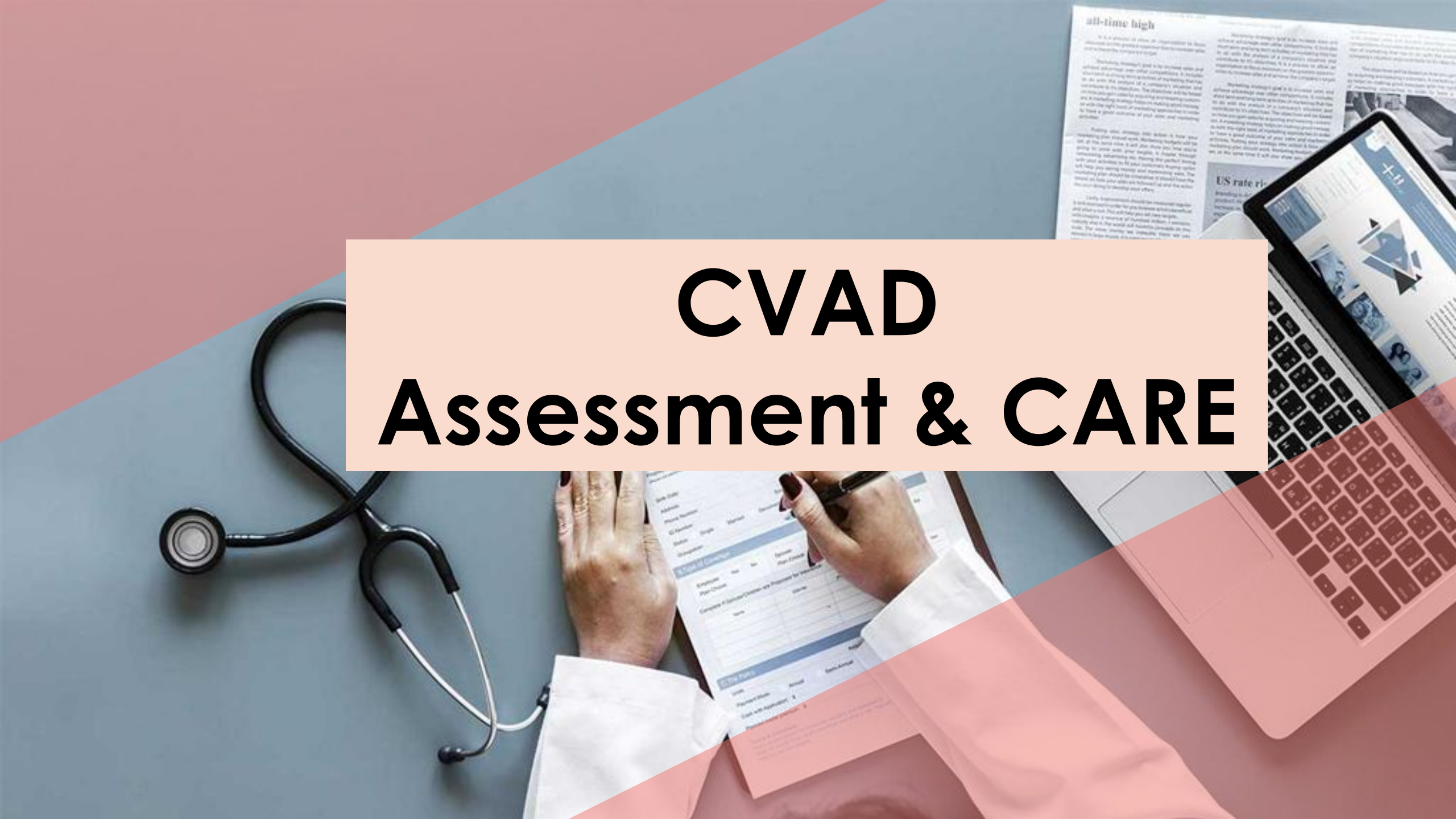


# CVAD Complications

✓CVADs can be associated with complications such as catheter occlusion or rupture, venous thrombosis, and bloodstream infection.

✓These complications can be immediate or delayed in nature. Immediate complications occur at the time of catheter insertion.

✓ Recognition and management of central line complications is important when caring for patients with vascular access, but prevention is the ultimate goal (Kornbau et. Al 2015).



# CVAD
# Assessment & CARE

# CVAD ASSESSMENT & CARE

✓CVAD is routinely assessed and is removed upon unresolved complication and when no longer necessary for treatment.

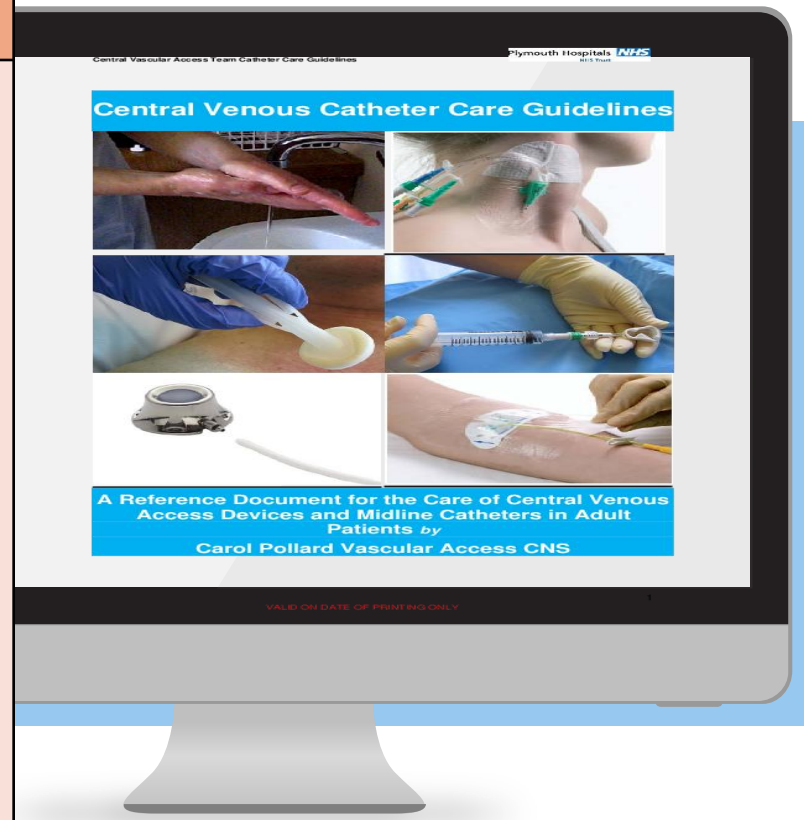
✓ Assessed for system integrity, infusion accuracy, identification of complications, and expiration dates of the infusate, dressing, and administration set.

# CVAD ASSESSMENT & CARE

| Practice recommendations | |
|---|---|
| Assessment | ▪ Assess CVAD patency<br>▪ Assess the CVAD site and surrounding area<br>▪ Assess entire infusion system, and patient for signs of complications<br>▪ Assess the integrity of securement devices designed to remain in place for the life of the CVAD |

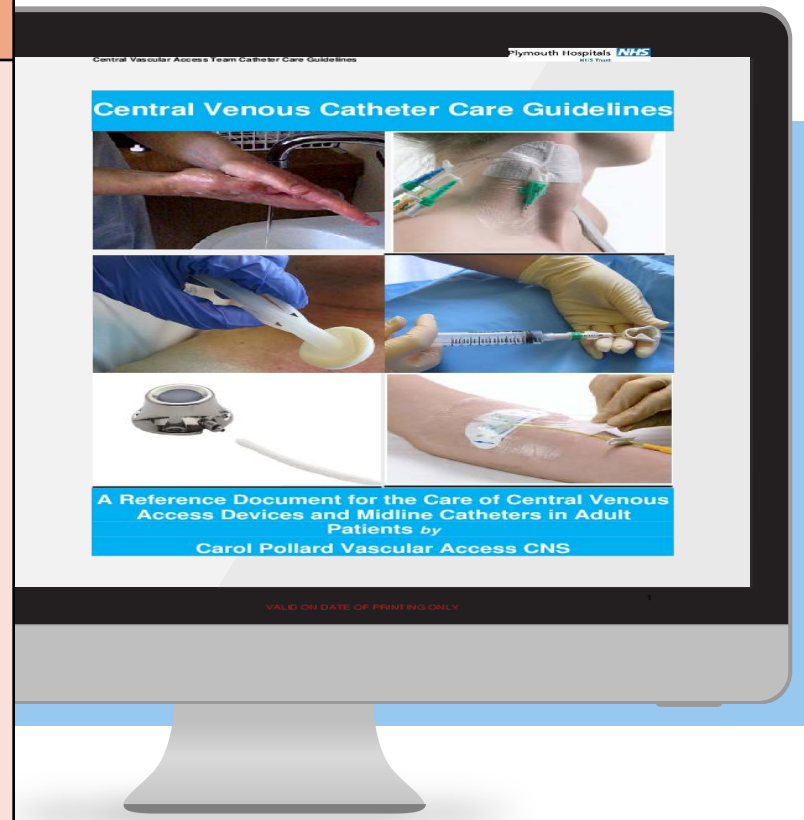
# CVAD ASSESSMENT & CARE

| Practice recommendations | |
|---|---|
| **CVAD patency** | ▪ Assess CVAD function using a 10-mL syringe or a syringe specifically designed to generate lower injection pressure (ie, 10-mL diameter syringe barrel), taking note of any resistance.<br>▪ Flush the CVAD lumen with preservative-free 0.9% sodium chloride following the administration of an IV push medication at the same rate of injection as the medication.<br>▪ Use positive-pressure techniques to minimize blood reflux into the CVAD lumen.<br>▪ Lock CVADs with either preservative-free 0.9% sodium chloride or heparin 10 units/mL according to the manufacturers' directions for use for the CVAD and needleless connector. |



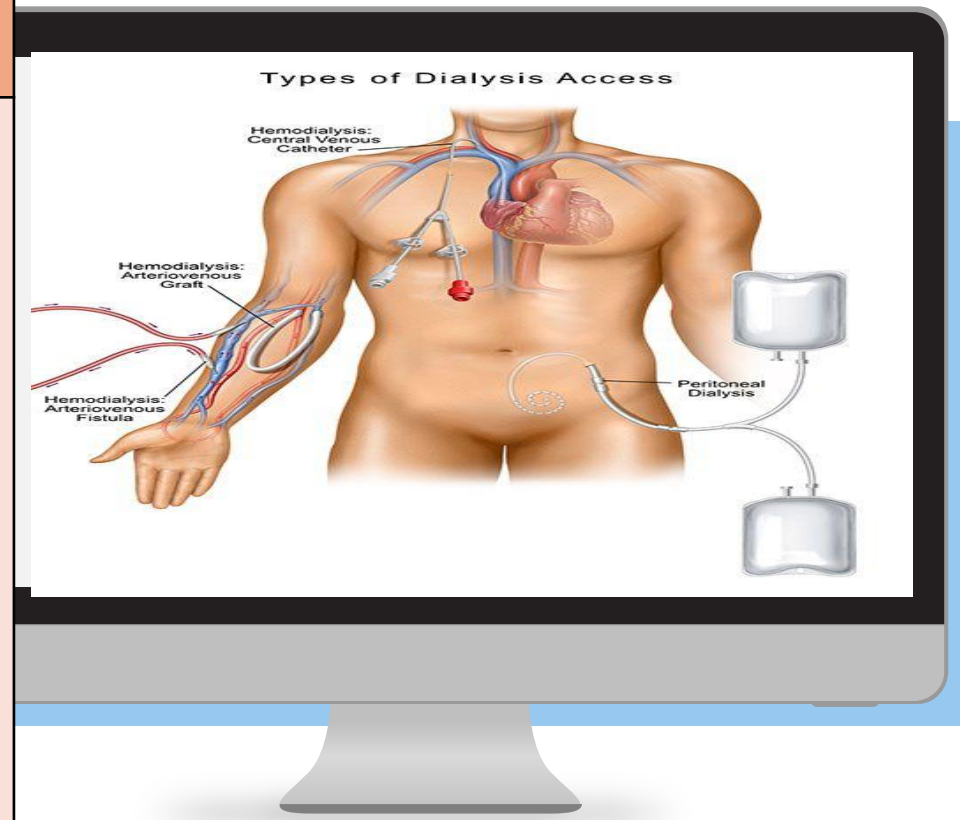
# CVAD ASSESSMENT & CARE

| Practice recommendations | |
|---|---|
| **CVAD patency** | ▪ Use a minimum volume equal to twice the internal volume of the catheter system (eg, catheter plus add-on devices). Larger volumes (10 mL for CVADs) may remove more fibrin deposits, drug precipitate, and other debris from the lumen.<br>▪ Factors to consider when choosing the flush volume include the type and size of catheter, age of the patient, and type of infusion therapy being given. Infusion of blood components, blood sampling, PN, contrast media, and other viscous solutions may require larger flush volumes. |



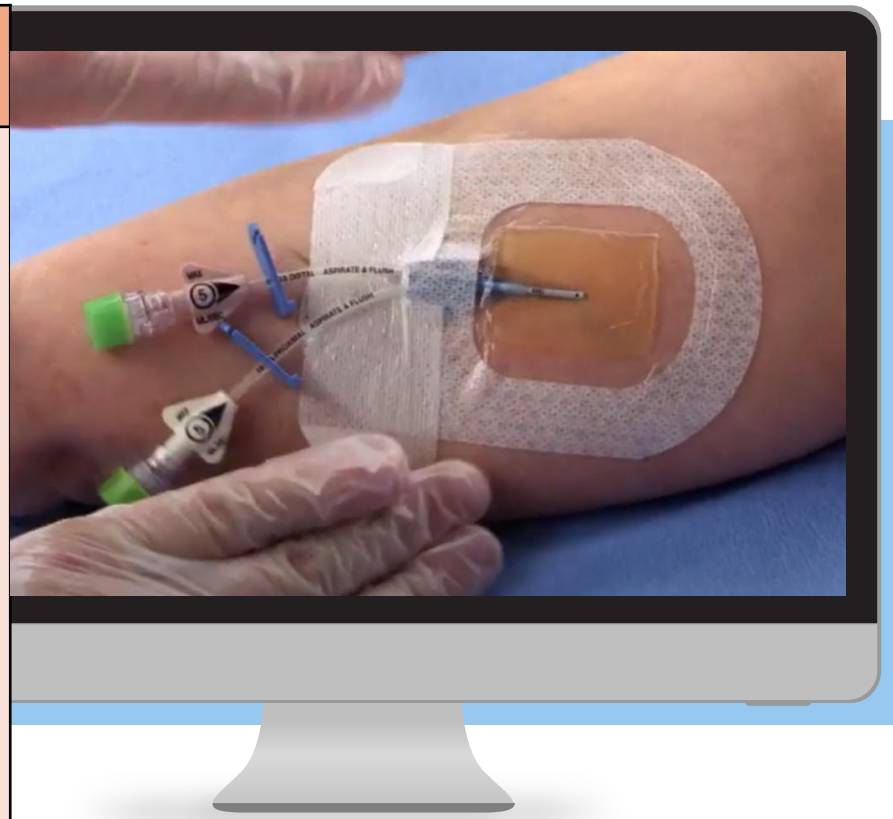
# CVAD ASSESSMENT & CARE

| Practice recommendations | |
|---|---|
| **CVAD patency** | ▪ Lock hemodialysis CVADs with citrate or heparin lock solution; low-concentration citrate (<5%) is recommended to reduce the risk of CABSI and CVAD dysfunction.<br>▪ Change to an alternative locking solution when the heparin lock solution is thought to be the cause of adverse drug reactions from heparin.<br>▪ Use antimicrobial locking solutions for therapeutic and prophylactic purposes in patients with long-term CVADs in the following circumstances. |



# CVAD ASSESSMENT & CARE

| Practice recommendations | |
|---|---|
| **CVAD site and surrounding area** | ▪ Identify signs of complications (eg, evidence of dislodgement, redness, tenderness, swelling, infiltration, induration, body temperature elevation, and drainage) by visual inspection and palpation through the dressing and through patient reports about any discomfort (eg, pain, paresthesias, numbness, or tingling).<br><br>▪ Remove nontransparent dressing to visually inspect site if patient has local tenderness or other signs of possible local infection; otherwise, use palpation for assessment. |

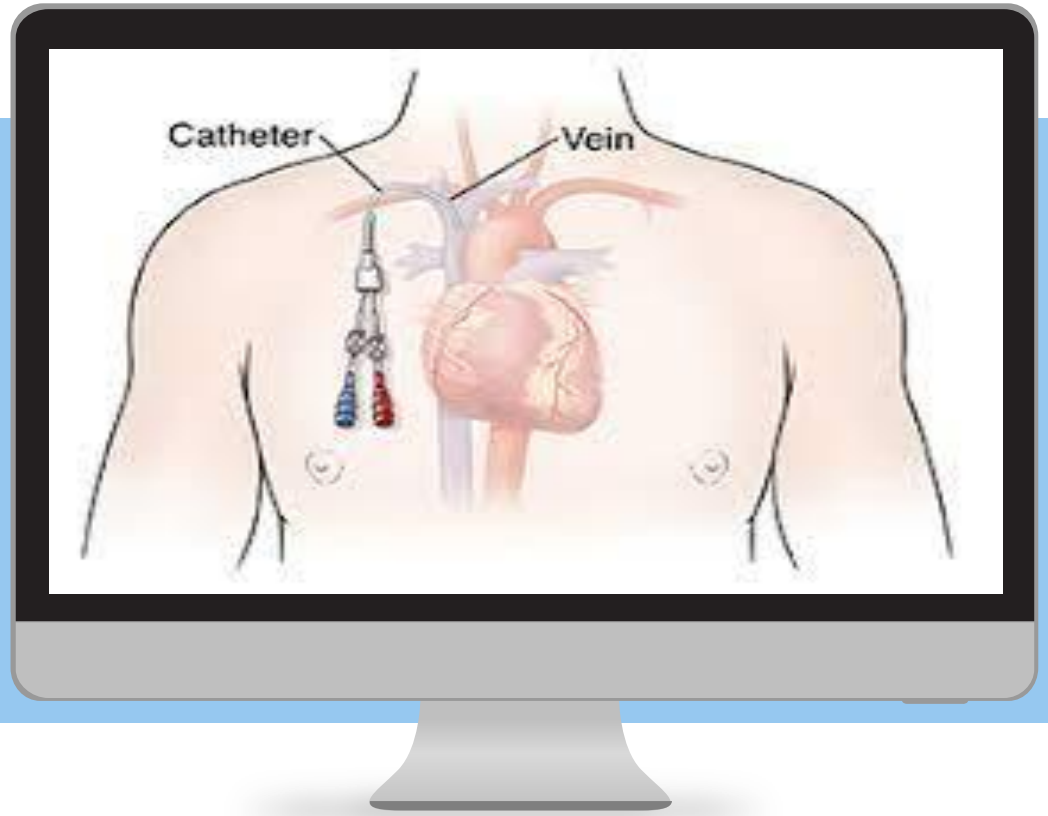


# CVAD ASSESSMENT & CARE

| Practice recommendations | |
|---|---|
| **CVAD site and surrounding area** | ▪ Measure the external CVAD length at each dressing change or when catheter dislodgement is suspected and compare to the external CVAD length documented at insertion |

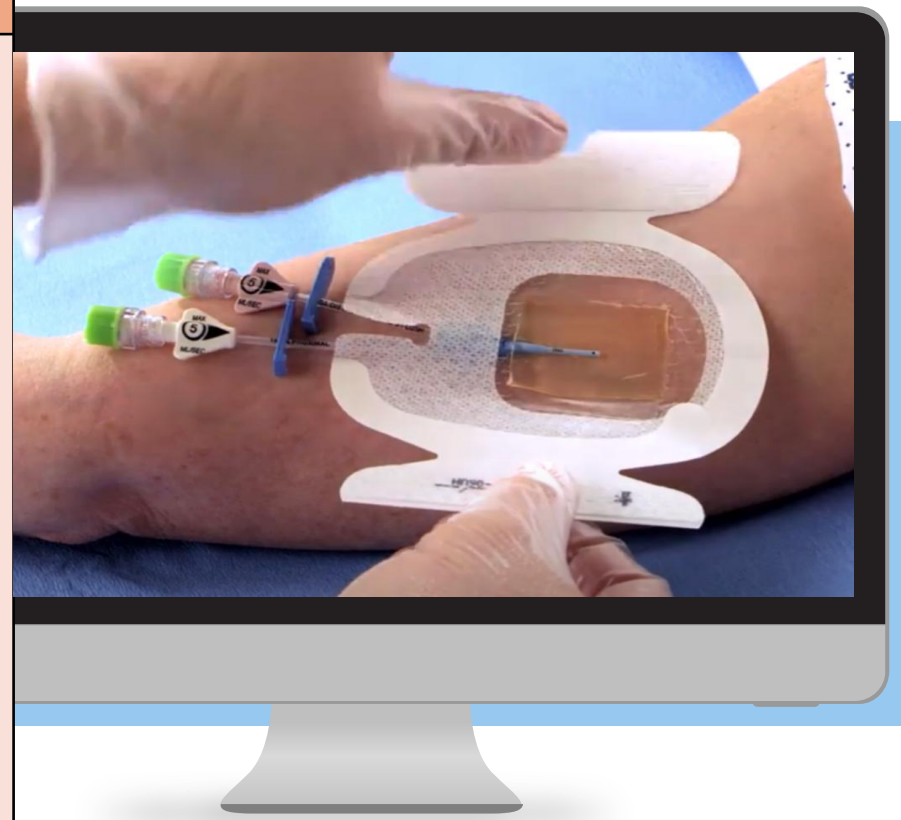
# CVAD ASSESSMENT & CARE

| Practice recommendations | |
|---|---|
| **Infusion system, and patient for signs of complications** | ▪ Assess CVADs with each infusion and at least daily; every 1 to 2 hours for patients who are critically ill/sedated or have cognitive deficits; hourly for neonatal/pediatric patients; and more often for patients receiving infusions of vesicant medications. |



# CVAD ASSESSMENT & CARE

| Practice recommendations | |
|---|---|
| **Integrity of securement devices designed to remain in place for the life of the CVAD** | ▪ Use a securement method (integrated securement device [ISD]; subcutaneous anchor securement system [SASS], tissue adhesive (TA) or adhesive securement device [ASD]), in addition to the primary dressing, to stabilize and secure CVADs.<br>▪ Inadequate securement can cause unintentional dislodgement and complications requiring premature removal.<br>▪ Assess the integrity of CVAD securement with each dressing change and change the securement device according to the manufacturers' directions for use. |



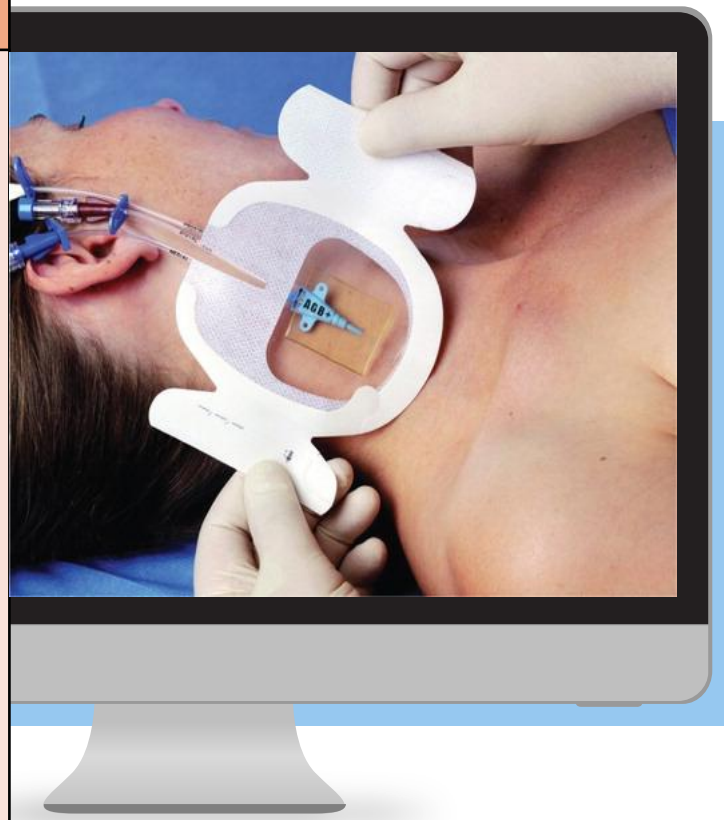
# CVAD
# Dressing Changes

# DRESSING CHANGES

| Practice recommendations | |
|---|---|
| **Dressing changes** | ▪ Change transparent semipermeable membrane (TSM) dressings at least every 7 days (except neonatal patients) or immediately if dressing integrity is disrupted (eg, lifted/detached on any border edge or within transparent portion of dressing; visibly soiled; presence of moisture, drainage, or blood) or compromised skin integrity is present under the dressing.<br><br>▪ In neonatal patients, perform dressing change as needed per patient or clinical indications due to risk of catheter dislodgement, patient discomfort, or skin injury. |

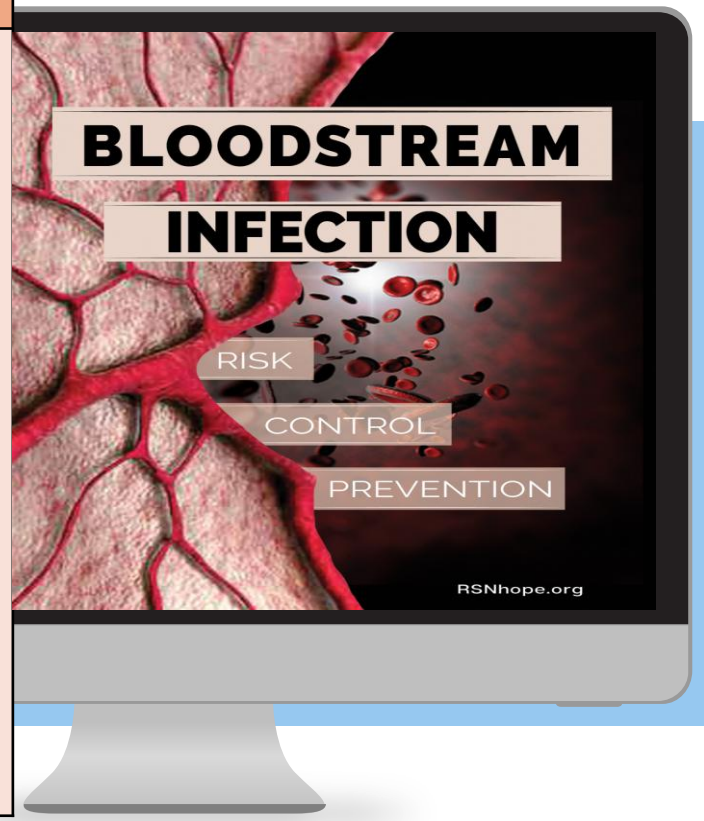
# DRESSING CHANGES

| Practice recommendations | |
|---|---|
| **Dressing changes** | ▪ Change sterile gauze at least every 2 days when inspection of the insertion site is necessary or if dressing integrity disrupted (eg, if damp, loosened, or visibly soiled); note that a gauze dressing underneath a TSM dressing is considered a gauze dressing, unless the site is not obscured (eg, to support wings of an implanted CVAD noncoring needle).<br><br>▪ Perform dressing changes on CVADs, using either Standard-ANTT or Surgical-ANTT (based on ANTT risk assessment of ability to prevent touching Key-Sites and Key-Parts). |



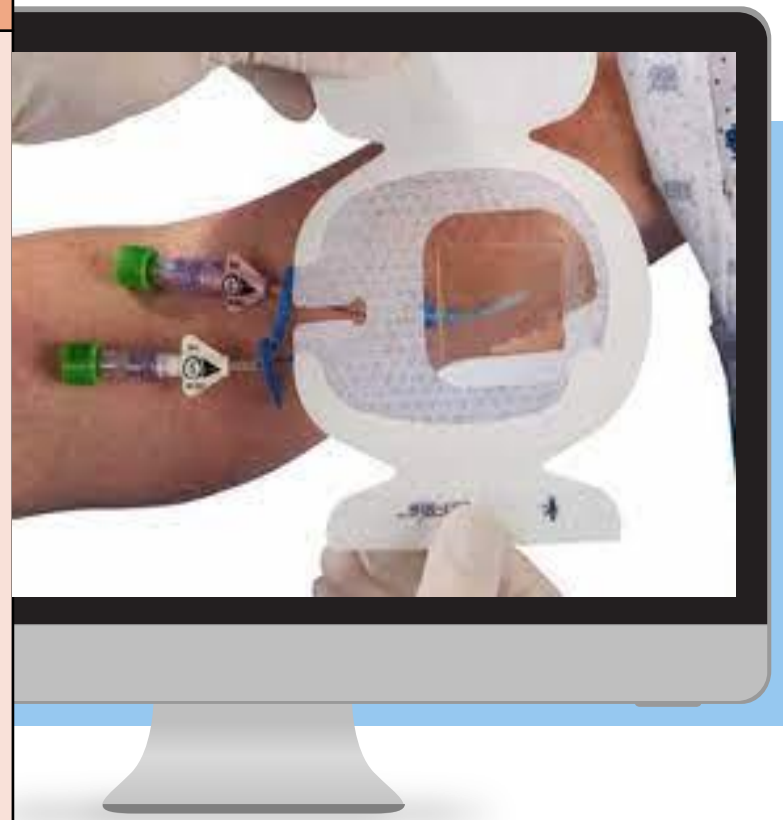
# DRESSING CHANGES

| Practice recommendations | |
|---|---|
| **Dressing changes** | ▪ Use a dressing change kit to standardize the procedure and improve time efficiency.<br>▪ Prepare skin for optimal skin health and dressing adherence.<br>▪ Select the type of sterile dressing (TSM or gauze) considering factors such as the type of CVAD, risk of bleeding or infection, skin condition, known allergies or sensitivities, patient size, patient preference, cost, sterility, wear time, and ease of use of dressing, with the goal of selecting and applying a dressing that will have minimal dressing disruptions (as multiple dressing changes increase the risk of infection). |



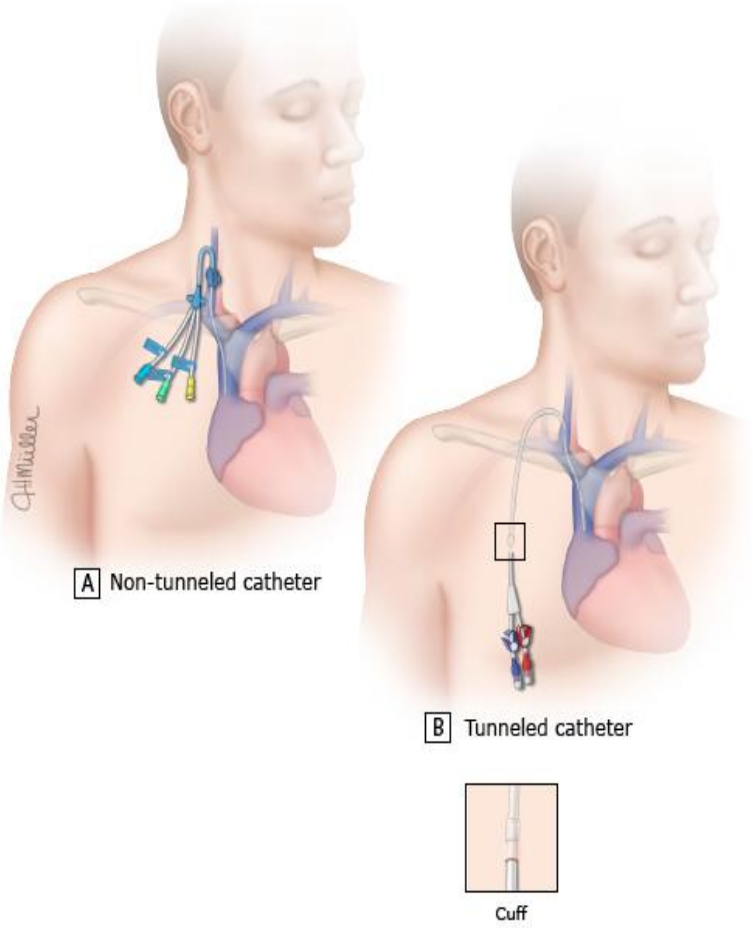
# DRESSING CHANGES

| Practice recommendations | |
|---|---|
| **Dressing changes** | ▪ Label the dressing with the date performed or date to be changed, avoiding placement of the label over the insertion/exit site.<br>▪ Use chlorhexidine bathing to minimize the risk of CABSI.<br>▪ Consider the use of daily chlorhexidine bathing in patients in the ICU with a CVAD in situ, including infants over 2 months of age, as a strategy to reduce CABSI if other CABSI prevention strategies have not been effective |



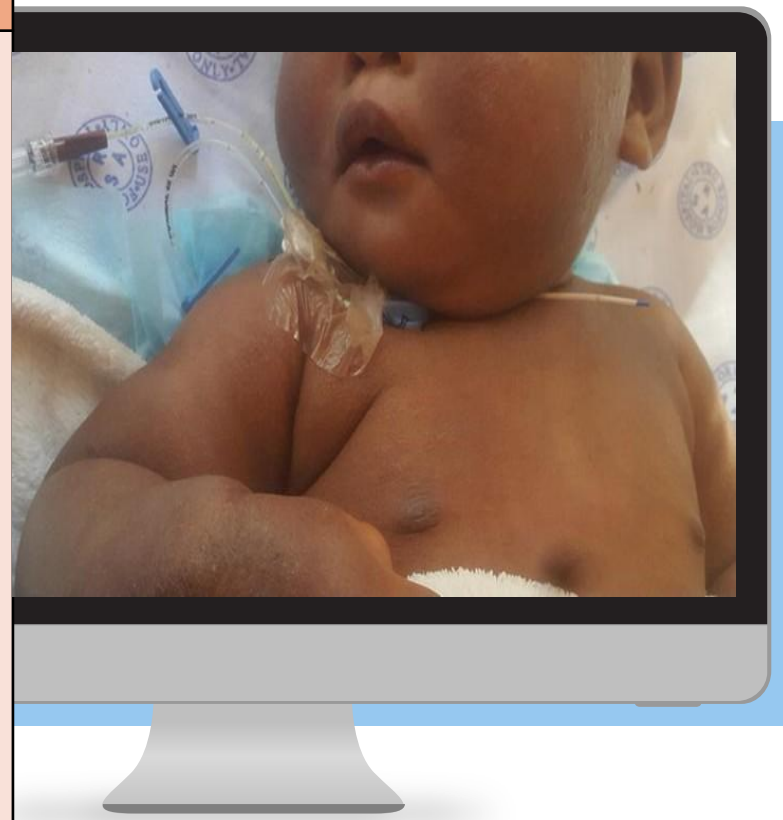
# DRESSING CHANGES

| Practice recommendations | |
|---|---|
| **Dressing changes** | ▪ Use chlorhexidine-impregnated dressings for all patients 18 years and older with short-term nontunneled CVADs. Use for other CVADs when all other CABSI prevention strategies have proven ineffective.<br>▪ Use with caution among patients with fragile skin and/or complicated skin pathologies; monitor for erythema and dermatitis at the dressing site.<br>▪ For premature neonates, chlorhexidine-impregnated dressings are not recommended to protect the site of short-term, nontunneled CVADs due to the risk of serious adverse skin reactions.<br>▪ For tunneled, cuffed CVADs, a dressing may no longer be required when the subcutaneous tunnel is healed. |



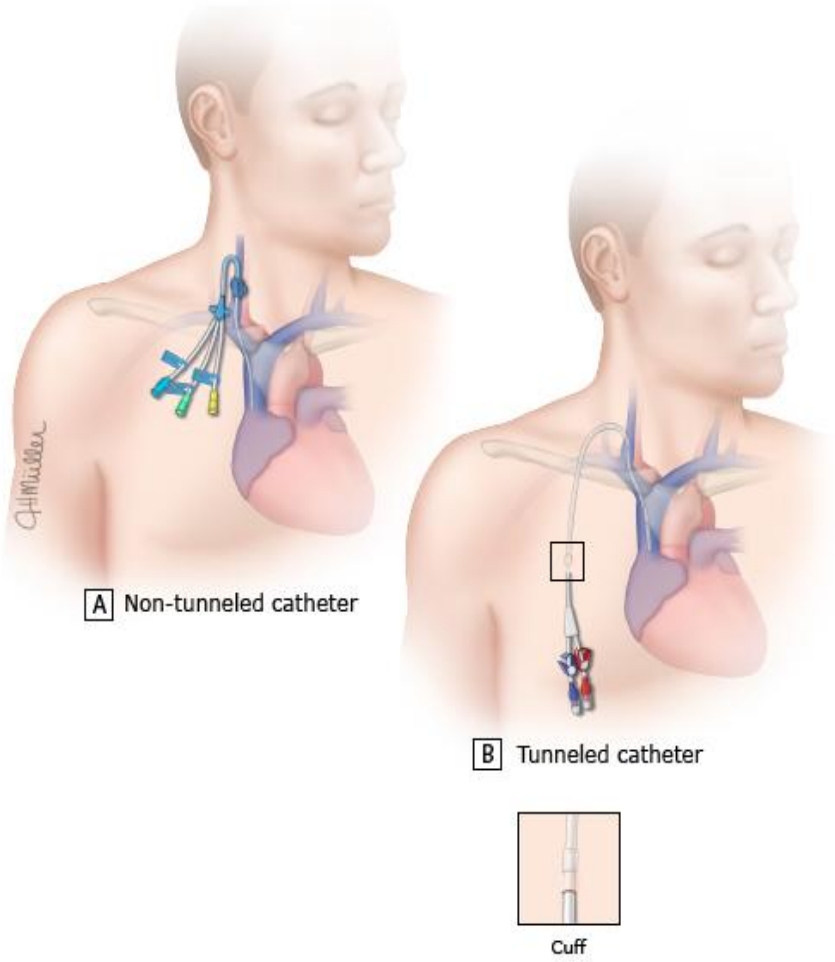
# DRESSING CHANGES

| Practice recommendations | |
|---|---|
| **Pediatric Patients** | ▪ For pediatric patients less than 18 years and nonpremature neonates, no recommendation can be made about the use of chlorhexidine-impregnated dressings to protect the site of short-term, nontunneled CVADs due to the lack of enough evidence.<br>▪ More large clinical trials are needed to confirm the clinical efficacy and safety in this patient population. |



# CVAD ASSESSMENT

| Practice recommendations | |
|---|---|
| **Nontunneled CVAD** | ▪ For nontunneled CVADs inserted into veins of the neck and groin, the most effective method of dressing and securement remains challenging and unclear.<br>▪ Pilot trials undertaken in adult and pediatric patients in critical care units demonstrate that alternatives such as integrated securement device (ISD) and tissue adhesive (TA) used in conjunction with sutures might reduce failure compared to adhesive securement device (ASD) and traditional sutures alone; however, further trials are necessary. |



# Evidence-based

Cochrane Library

Cochrane Database of Systematic Reviews | Review - Intervention

**Dressings and securement devices for central venous catheters (CVC)**

Amanda J Ullman, Marie L Cooke, Marion Mitchell, Frances Lin, Karen New, Debbie A Long, Gabor Mihala, Claire M Rickard Authors' declarations of interest

Version published: 11 September 2015 Version history

https://doi.org/10.1002/14651858.CD010367.pub2

There is *moderate quality evidence* that CGI dressings reduce the frequency of catheter-related BSI per 1000 patient days compared with SPU dressings (RR 0.51, 95% CI 0.33 to 0.78).

There is *moderate quality evidence* that catheter tip colonisation is reduced with CGI dressings compared with SPU dressings (RR 0.58, 95% CI 0.47 to 0.73), but the relative effects of gauze and tape and SPU are unclear (RR 0.95, 95% CI 0.51 to 1.77, *very low quality evidence*). It is unclear if there is a difference in rates of skin irritation or damage when CGI dressings are compared with SPU dressings (*moderate quality evidence)* (RR 11.17, 95% CI 0.84 to 149.48).

A multiple treatment meta-analysis found sutureless securement devices as likely to be the most effective at reducing the incidence of catheter-related BSI (*low quality evidence*), with CGI dressings ranked second (*low quality evidence*).

## Systematic review findings

**DESIGN**

- Systematic review

**OBJECTIVE**

- To compare the available dressing and securement devices for CVCs, in terms of catheter-related bloodstream infection (BSI), catheter colonisation, entry- and exit-site infection, skin colonisation, skin irritation, failed catheter securement, dressing condition and mortality.

**RESULTS**

- 22 studies involving 7436 participants comparing nine different types of securement device or dressing.
- Medication-impregnated dressing products reduce the incidence of catheter-related BSI relative to all other dressing types.
- There is moderate quality evidence that CGI dressings, relative to SPU dressings, reduce catheter-related BSI for the outcomes of frequency of infection per 1000 patient days, risk of catheter tip colonisation and possibly risk of catheter-related BS

# Evidence-based

RESEARCH ARTICLE

## Cost-Effectiveness Analysis of a Transparent Antimicrobial Dressing for Managing Central Venous and Arterial Catheters in Intensive Care Units

**Franck Maunoury[1☯]*, Anastasiia Motrunich[1☯], Maria Palka-Santini[2☯], Stéphanie F. Bernatchez[3], Stéphane Ruckly[4], Jean-François Timsit[4,5,6]**

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☯ These authors contributed equally to this work.
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## Results

The chlorhexidine gluconate dressing prevents 11.8 infections /1,000 patients (95% confidence interval: [3.85; 19.64]) with a number needed to treat of 85 patients. The mean cost difference per patient of €141 is not statistically significant (95% confidence interval: [€-975; €1,258]). The incremental cost-effectiveness ratio is of €12,046 per catheter-related bloodstream infection prevented, and the incremental net monetary benefit per patient is of €344.88.

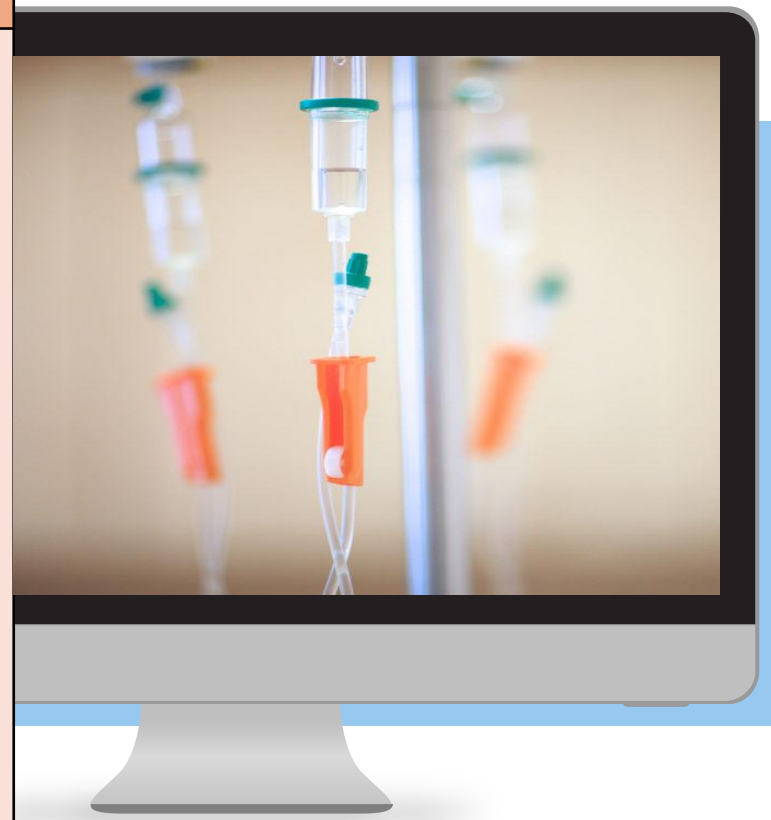
## Conclusions

According to the base case scenario, the chlorhexidine gluconate dressing is more cost-effective than the reference dressing.

# CVAD Administration Set Changes

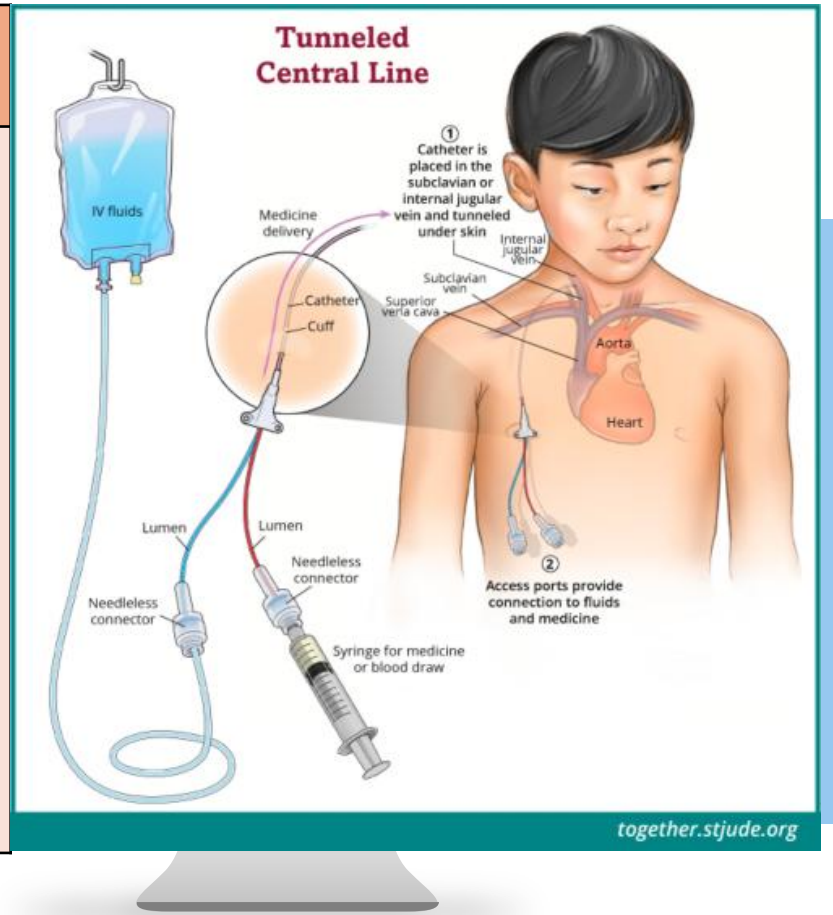
# ADMINISTRATION SET CHANGES

| Standards | |
|---|---|
| **Administration Set Changes** | ▪ Administration set changes are performed with adherence to Standard-ANTT at a frequency based upon factors such as patient condition, type, rate, and frequency of solution administered, immediately upon suspected contamination, when the integrity of the product or system has been compromised, and when a new CVAD is placed.<br><br>▪ Administration sets are of a luer-lock design to ensure a secure connection, reduce manipulation, and minimize the risk of leaks, disconnections, or misconnections. |



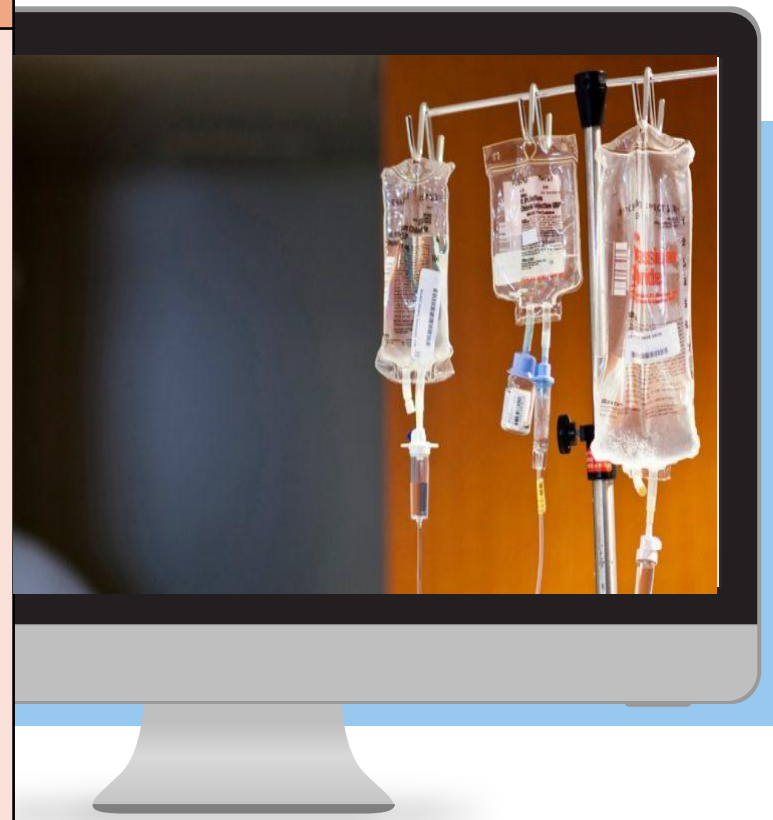
# ADMINISTRATION SET CHANGES

| Practice Recommendations | |
|---|---|
| **Administration Set Changes** | ▪ Use administration sets with integrated add-on devices (eg, filters) to minimize the number of connections, thus reducing the risk of contamination, misuse, and accidental disconnection.<br>▪ Use administration sets with luer-lock design; use administration sets with anti—free-flow mechanisms with electronic infusion pumps.<br>▪ Never use an administration set for more than 1 patient. |



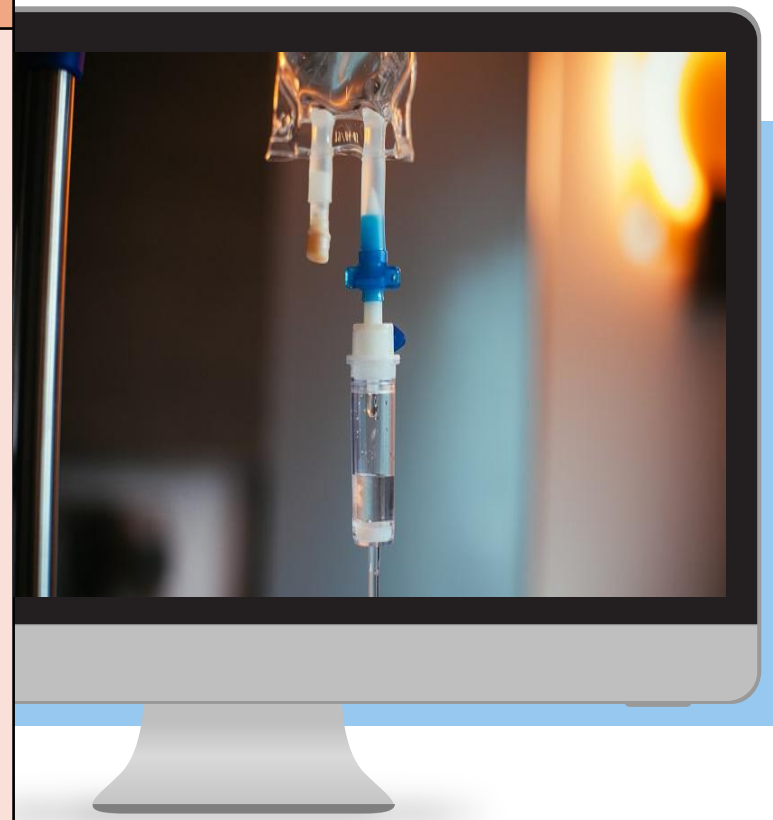
# ADMINISTRATION SET CHANGES

| Practice Recommendations | |
|---|---|
| **Administration Set Changes** | ▪ Use administration sets with composite material recommended for drugs at risk of tubing adsorption, which may affect accuracy of drug delivery (eg, nitroglycerin, diazepam, insulin). Monitor clinical response to medication.<br>▪ Consider use of a new administration set when initiating a new concentration of a continuous IV medication to prevent infusing any of the previous concentration remaining in the tubing at the rate intended for the new concentration. |



# ADMINISTRATION SET CHANGES

| Practice Recommendations | |
|---|---|
| **Administration Set Changes** | ▪ Adhere to Standard-ANTT when connecting, changing, and accessing administration set injection ports.<br>▪ Use an extension set with parallel lumens when multiple administration sets must be connected to the same CVAD lumen. Delays in flow rates, leakage from the infusion system, and other unintended therapy interruptions are reduced with these extension sets as compared to a manifold of multiple stopcocks.<br>▪ Label administration sets. Indicate the date of initiation or date of change based on organizational policies, procedures, and/or practice guidelines. |

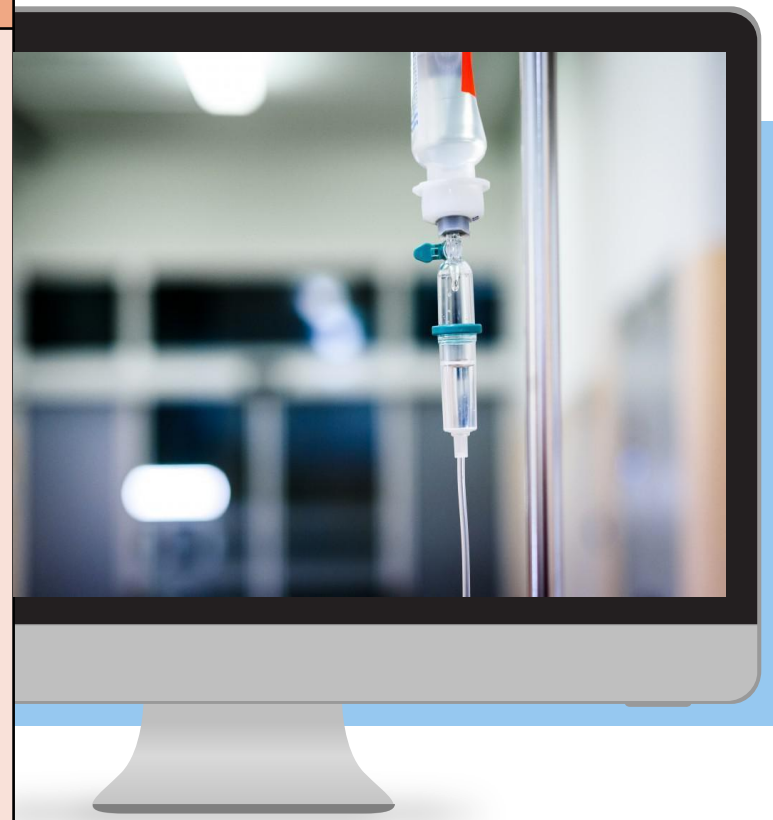


# ADMINISTRATION SET CHANGES

| Practice Recommendations | |
|---|---|
| **Administration Set Changes** | ▪ Teach nonclinical staff, patients, and caregivers not toconnect/disconnect administration sets to prevent misconnections. In some home care setting situations, caregivers may connect and disconnect devices if they are trained and competency is demonstrated. |

# ADMINISTRATION SET CHANGES

| Practice Recommendations | |
|---|---|
| **Primary and Secondary Continuous Infusions** | ▪ Replace primary and secondary continuous administration sets used to administer solutions other than lipid, blood, or blood products no more frequently than every 96 hours but at least every 7 days (unless otherwise stated in manufacturers' directions for use), when the CVAD is changed, or if the integrity of the product or system has been compromised.<br><br>▪ Plan to change the primary administration set to coincide with the CVAD change and/or initiation of a new solution container. |



# ADMINISTRATION SET CHANGES

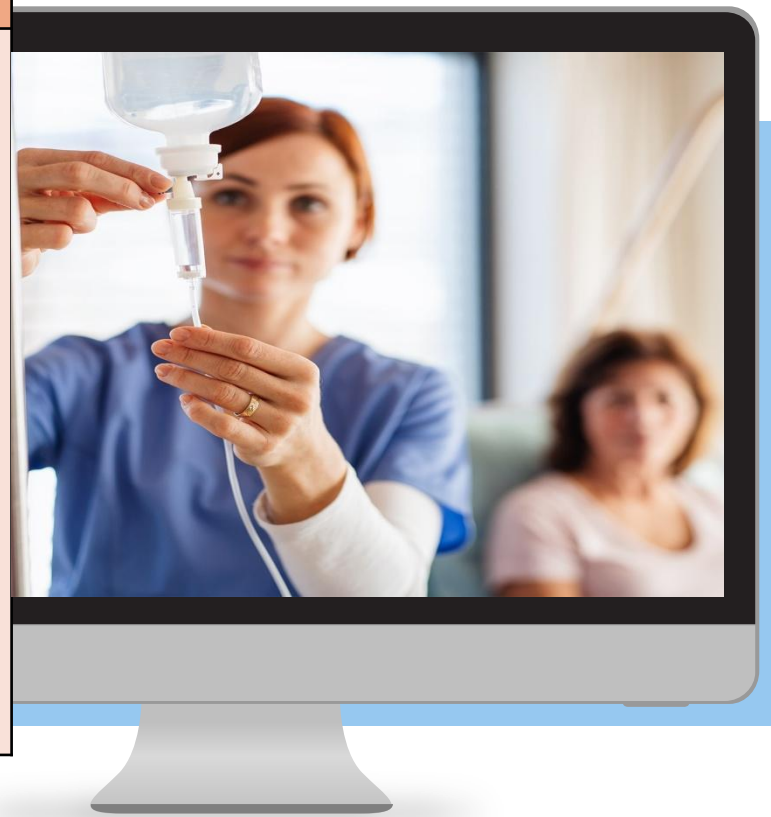
| Practice Recommendations | |
|---|---|
| **When using a secondary administration set** | ▪ Use a primary continuous administration set that contains a back-check valve or use a dedicated pump set with integrated mechanisms to prevent retrograde flow of the secondary medication into the primary solution container.<br><br>▪ When high-risk medications are given through the primary infusion system concurrently with the primary infusion, attach the administration set below the electronic infusion pump controlling the primary fluid flow and use a separate electronic infusion pump to control the rate of the high-risk medication. |

# ADMINISTRATION SET CHANGES

| Practice Recommendations | |
|---|---|
| **When using a secondary administration set** | ▪ Avoid disconnecting primary and secondary continuous administration sets whenever possible.<br>▪ When administering a secondary intermittent medication, check compatibility with the primary solution; this avoids the need to disconnect or replace the secondary administration set. If compatible, use the secondary administration set and back prime from the primary infusion container.<br>▪ If the secondary administration set is disconnected from the primary set, the secondary administration set is now considered a primary intermittent administration set and is changed every 24 hours. |

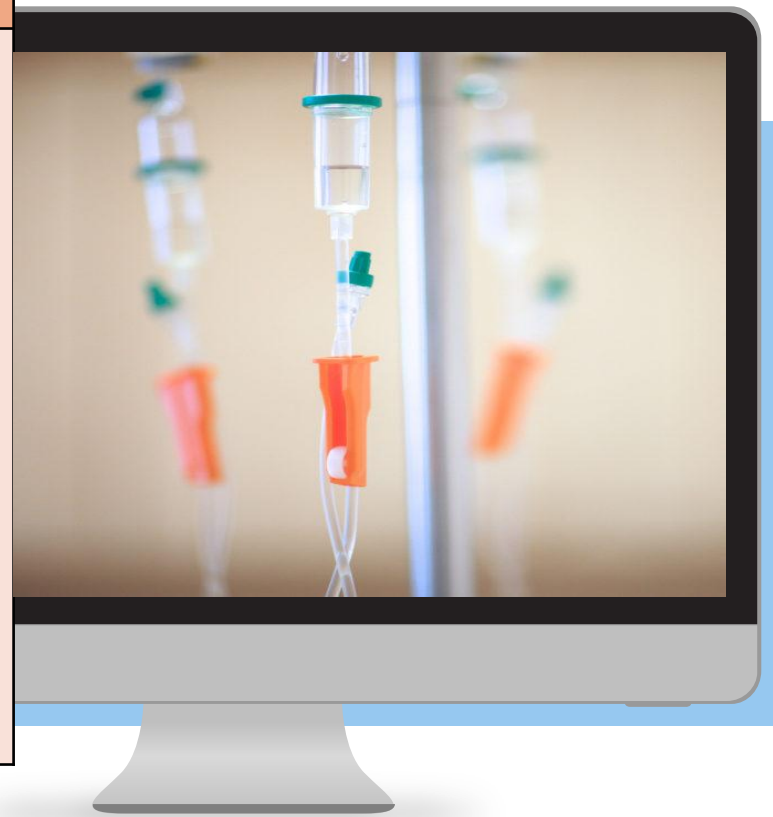
# ADMINISTRATION SET CHANGES

| Practice Recommendations | |
|---|---|
| **Primary Intermittent Infusions** | ▪ Change intermittent administration sets every 24 hours.<br>▪ Attach a new, sterile, compatible covering device to the male luer end of the administration set after each intermittent use. Do not attach the exposed male luer end of the administration set to a port on the same administration set. |



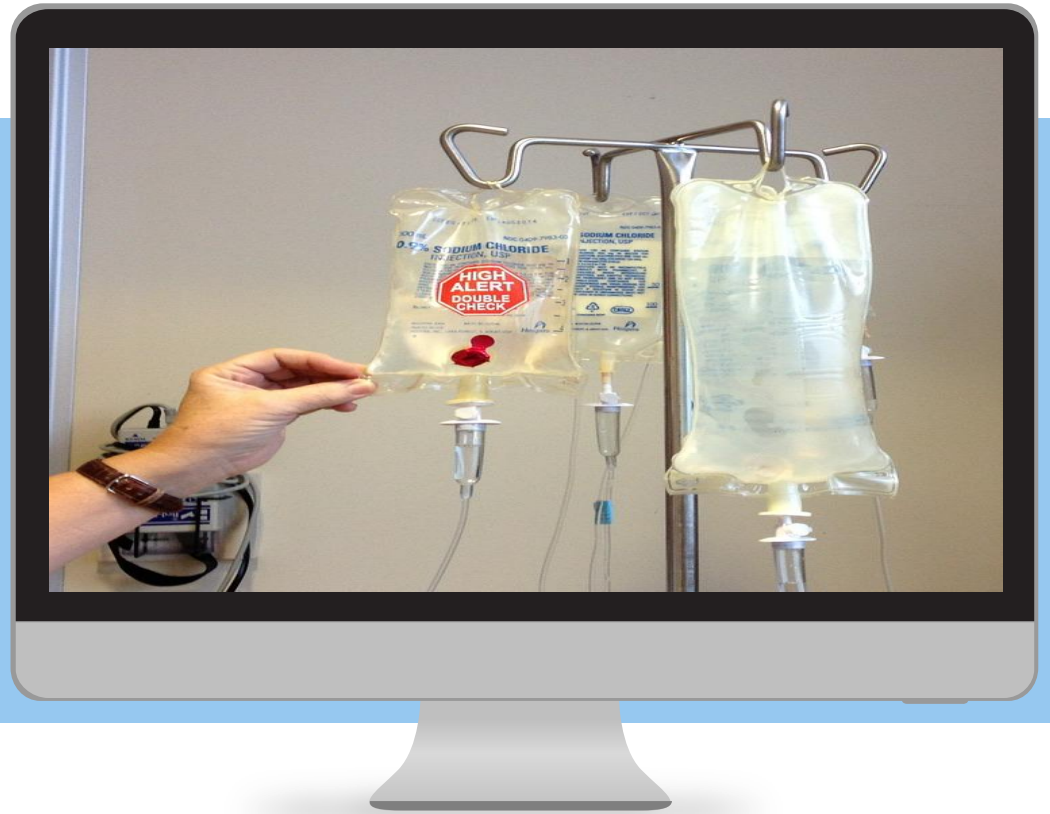
# ADMINISTRATION SET CHANGES

| Practice Recommendations | |
|---|---|
| **Parenteral Nutrition** | ▪ Replace administration sets with inline and add-on filters for PN solutions (with or without lipids) every<br>▪ 24 hours or with each new PN container.<br><br>▪ Replace administration sets used for ILE infused separately every 12 hours and with each new container/as per product monograph. The characteristics of ILE (iso-osmotic, near neutral-alkaline pH, and containing glycerol) are conducive to the growth of microorganisms.<br><br>ILE (Lipid Injectable Emulsion) |



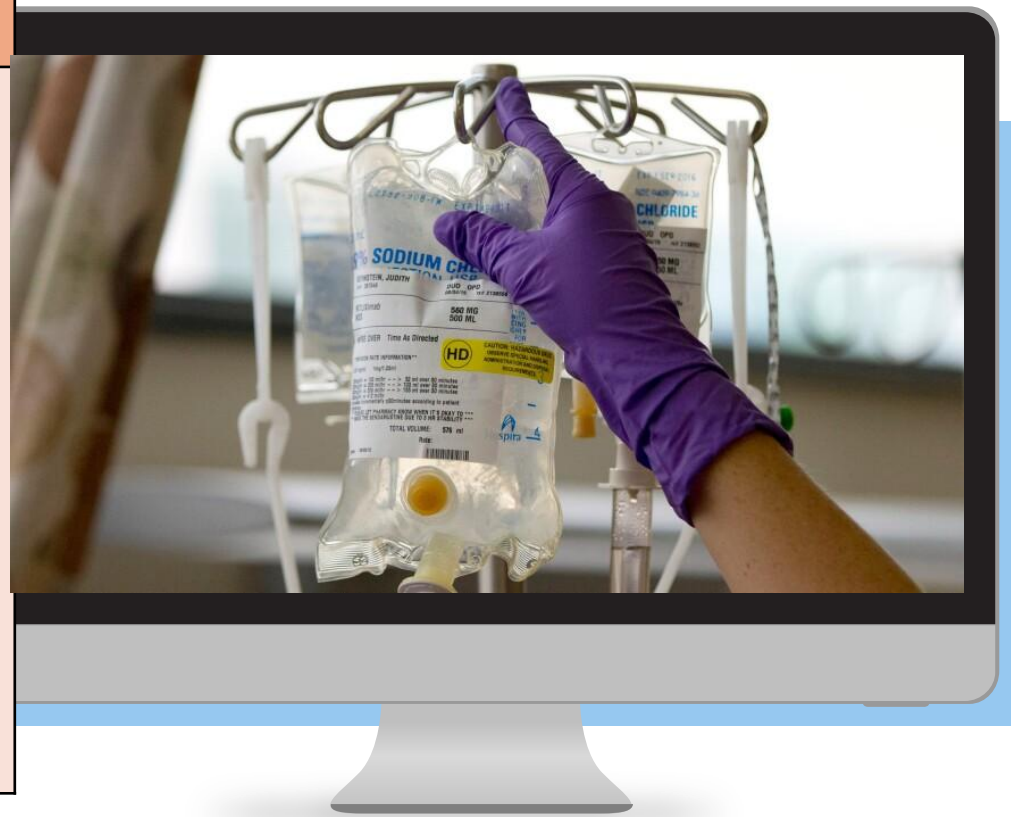
# ADMINISTRATION SET CHANGES

| Practice Recommendations | |
|---|---|
| **Propofol Infusions** | ▪ Replace administration sets used to administer propofol infusions at least every 6 to 12 hours, per the manufacturers' directions for use, or when the container is changed. |



# ADMINISTRATION SET CHANGES

| Practice Recommendations | |
|---|---|
| **Blood Components** | ▪ Change the transfusion administration set in conjunction with manufacturers' directions for use.<br><br>▪ Transfusion guidelines from other countries recommend changing the administration set every 12 hours. Note that most standard filters have a 4-unit maximum capacity; follow manufacturers' directions for use. |



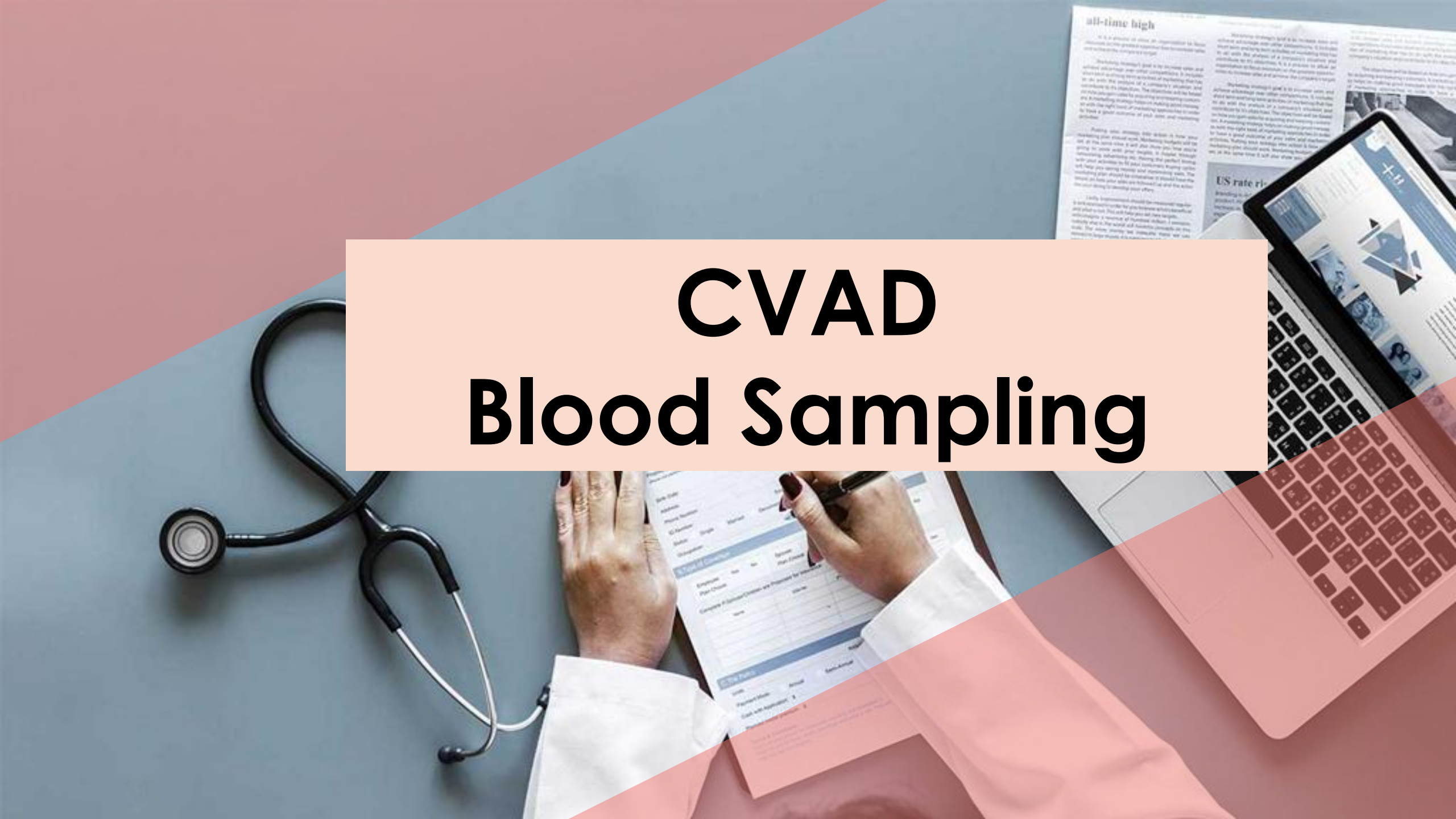
# CVAD Guidelines

What is the recommended frequency of administration set change for crystalloid fluids?

## * 18. Replacement of Administration Sets

1. In patients not receiving blood, blood products or fat emulsions, replace administration sets that are continuously used, including secondary sets and add-on devices, no more frequently than at 96-hour intervals, [177] but at least every 7 days [178–181]. ***Category IA***

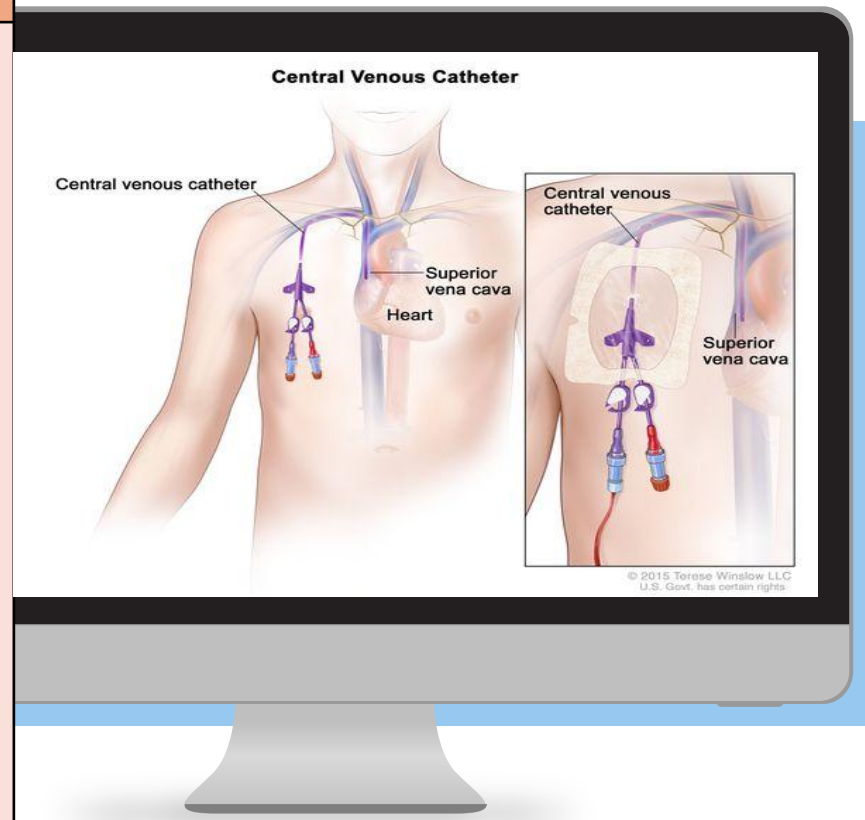
CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION



# CVAD
# Blood Sampling

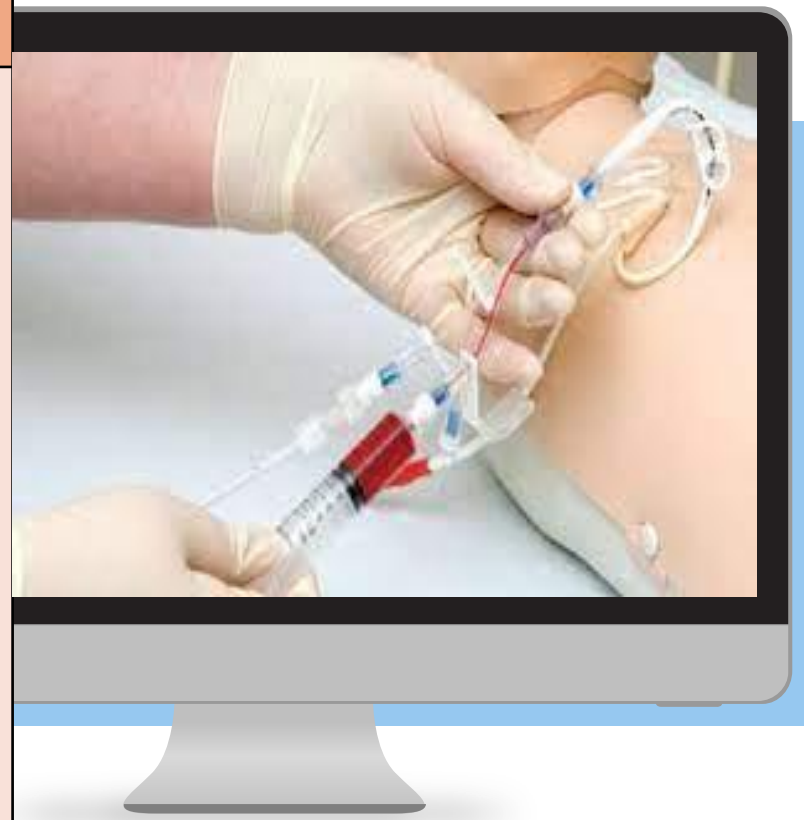
# BLOOD SAMPLING

| Practice Recommedations | |
|---|---|
| **Blood Sampling** | ▪ Educate the patient about the purpose and process for blood sampling.<br>▪ The patient should be in a seated or recumbent position. When chairs with safety features (eg, arm rest, protection from falling if syncope occurs) are not available, the recumbent position should be chosen.<br>▪ Advise the patient to avoid any exercise for 24 hours before blood sampling. Exercise and changes from supine to upright positions can alter plasma volume because of the force of gravity on venous hydrostatic changes and distribution of body fluids, which can change the values of hemoglobin, hematocrit, and other cell counts. |



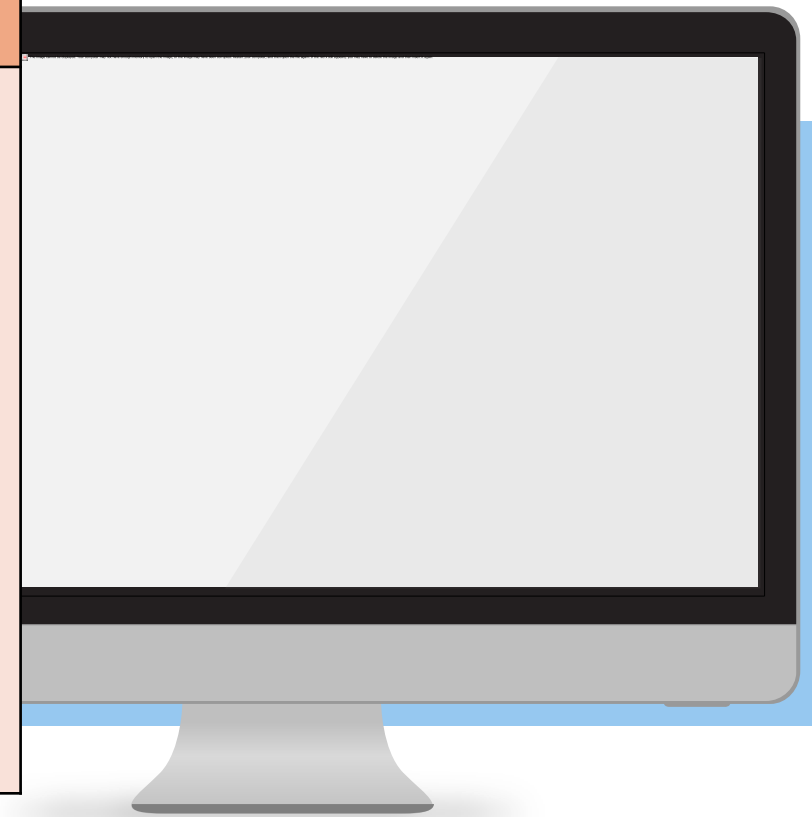
# BLOOD SAMPLING

| Practice Recommedations | |
|---|---|
| **Blood Sampling via CVAD** | ▪ Carefully analyze risks vs benefits before deciding to use a CVAD for obtaining blood samples.<br>▪ Draw the blood sample from a dedicated lumen not used for administration of the drug being monitored, if possible. Evaluate elevated test results when a dedicated CVAD lumen cannot be used.<br>▪ Prior to dose adjustment, retesting via direct venipuncture may be necessary. Provide drug name, dose, time of last infusion, and specimen collection time to the laboratory.<br>▪ Therapeutic drug monitoring is most common for anticoagulants, antibiotics, and immunosuppressants with dosage adjustment based on tests results. |



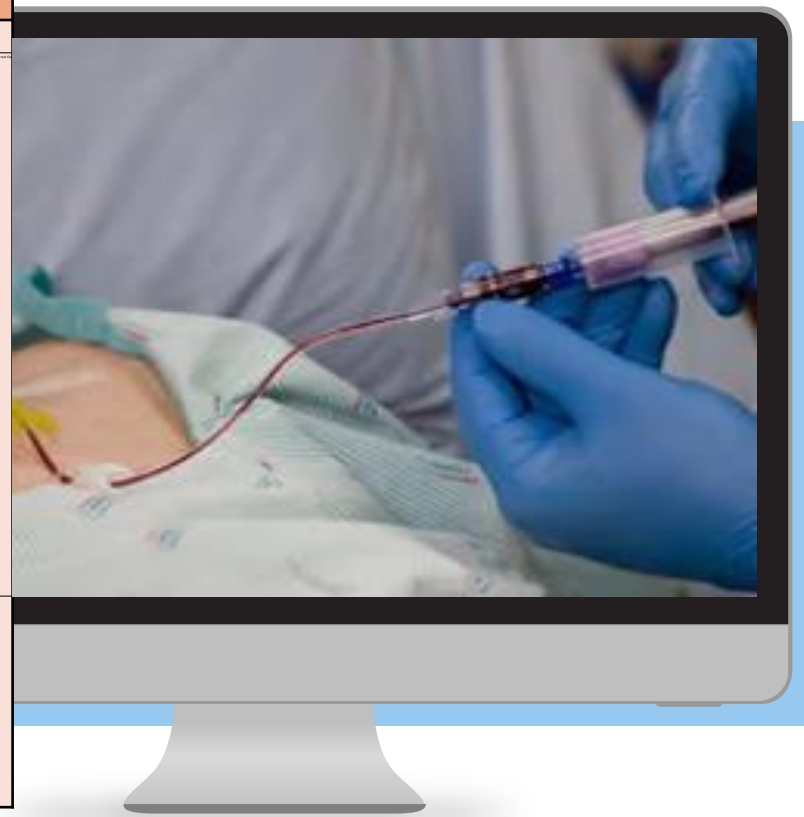
# BLOOD SAMPLING

| Practice Recommedations | |
|---|---|
| **Blood Sampling via CVAD** | ▪ Accuracy of coagulation values from a blood sample obtained from a heparinized CVAD are inconclusive due to many confounding variables.<br>▪ Avoid using a CVAD for obtaining blood samples for culturing as these samples are more likely to produce false-positive results.<br>▪ Evaluate the use of the push-pull (ie, mixing) method vs the discard method for obtaining a sample from CVADs. |



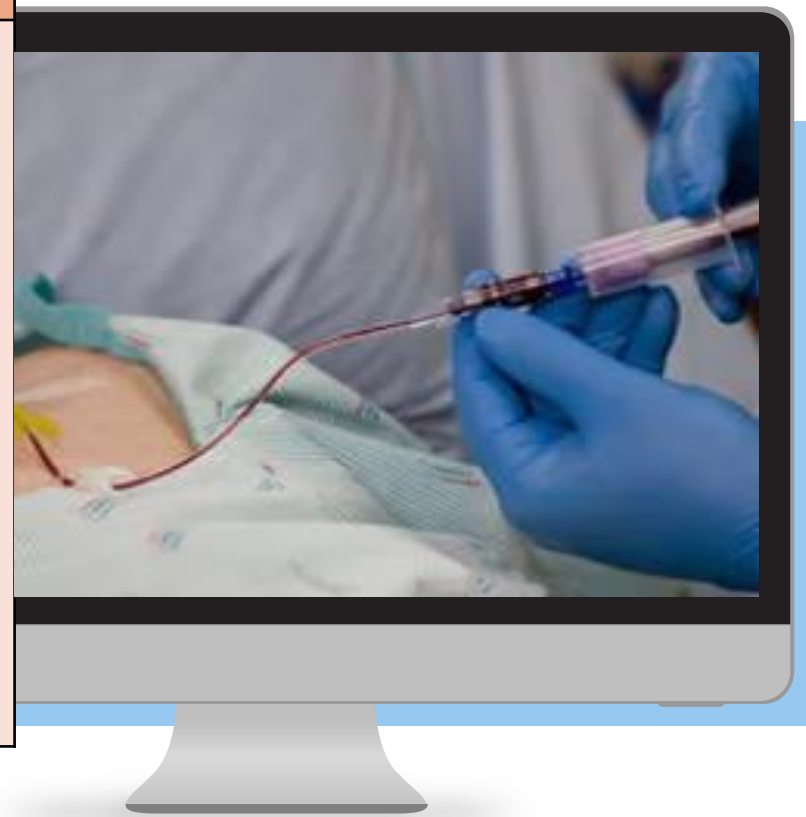
# BLOOD SAMPLING

| Practice Recommedations | |
|---|---|
| **Blood Sampling via CVAD** | ▪ The push-pull method produces clinically useful laboratory values in adults and pediatric patients while reducing the amount of wasted blood and reducing hub manipulation.<br><br>▪ Studies include complete blood counts, electrolytes, renal and liver function tests, glucose, coagulation studies, blood gases, C-reactive protein, and therapeutic drug monitoring for gentamicin. These studies report 4 to 6 mL of blood withdrawn into the syringe and flushed back into the catheter lumen without disconnecting the syringe. These aspiration/return or push-pull cycles are repeated for a total of 4 cycles. |

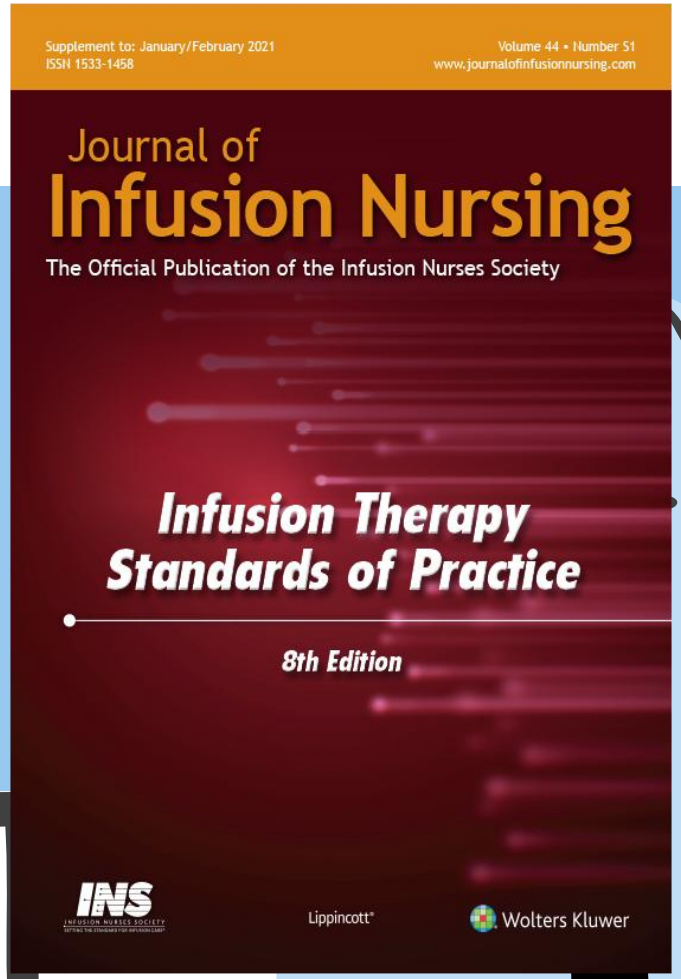


# BLOOD SAMPLING

| Practice Recommedations | |
|---|---|
| **Blood Sampling via CVAD** | ▪ For the discard method, studies of the volume for discard are limited, ranging from 2 to 25 mL. This wide variation depends upon the internal volume of the CVAD, saline flushing prior to drawing the discard volume, and the specific laboratory tests needed. Coagulation studies require the largest discard volume to produce accurate results; however, this volume could produce hospital-acquired anemia.<br>▪ Do not routinely use CVADs infusing PN for blood sampling as manipulation may increase the risk for CABSI. |



# The new INS Standards can help you reduce CVAD complications




In this, our time, I challenge you to read, reflect on, implement, and innovate from these important *Standards* so that your light shines within our vast global community of infusion therapy professionals.

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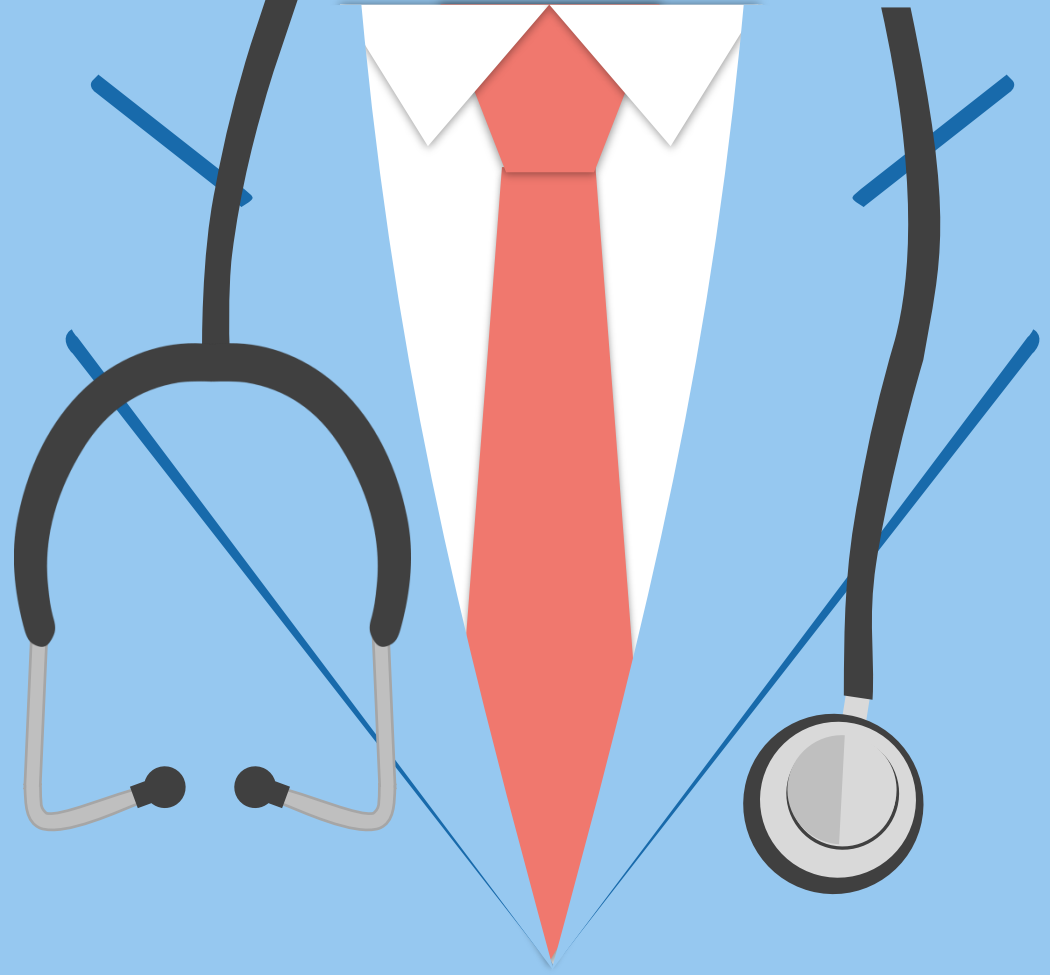

# THANK YOU