



University

HOSPITAL

Newark, NJ

Prevention of Central Line-Associated Bloodstream Infection (CLABSI)

Newark, NJ

Educational Objectives

Review best practices to prevent CLABSIs including:

- ✓ Assessing central venous catheter (CVC) appropriateness and removing unnecessary central lines
- ✓ Selecting CVC using a venous access catheter algorithm tree
- ✓ Selecting appropriate CVC site
- ✓ Following proper CVC insertion practices

Patient Harm and Costs of CLABSIs

- CLABSI are associated with high morbidity and mortality and increased hospital costs:
 - Prolongs length of hospital stay
 - Increases morbidity
 - Increases mortality by 12-15%
 - CDC estimates each CLABSI infection costs ~\$48,000/episode
- Over the last several years, CLABSIs continue to be a challenge at UH and reducing CLABSIs remains a high priority at UH



Keystone Bundle Checklist to Prevent CLABSIs

Checklist for Prevention of Central Line Associated Blood Stream Infections

Based on 2011 CDC guideline for prevention of intravascular catheter-associated bloodstream infections: <http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf>

For Clinicians:

Promptly remove unnecessary central lines

- Perform daily audits to assess whether each central line is still needed

Follow proper insertion practices

- Perform hand hygiene before insertion
- Adhere to aseptic technique
- Use maximal sterile barrier precautions (i.e., mask, cap, gown, sterile gloves, and sterile full-body drape)
- Perform skin antisepsis with >0.5% chlorhexidine with alcohol
- Choose the best site to minimize infections and mechanical complications
 - Avoid femoral site in adult patients
- Cover the site with sterile gauze or sterile, transparent, semipermeable dressings

Handle and maintain central lines appropriately

- Comply with hand hygiene requirements
- Scrub the access port or hub immediately prior to each use with an appropriate antiseptic (e.g., chlorhexidine, povidone iodine, an iodophor, or 70% alcohol)
- Access catheters only with sterile devices
- Replace dressings that are wet, soiled, or dislodged
- Perform dressing changes under aseptic technique using clean or sterile gloves

For Facilities:

- Empower staff to stop non-emergent insertion if proper procedures are not followed
- "Bundle" supplies (e.g., in a kit) to ensure items are readily available for use
- Provide the checklist above to clinicians, to ensure all insertion practices are followed
- Ensure efficient access to hand hygiene
- Monitor and provide prompt feedback for adherence to hand hygiene
- <http://www.cdc.gov/handhygiene/Measurement.html>
- Provide recurring education sessions on central line insertion, handling and maintenance

Supplemental strategies for consideration:

- 2% Chlorhexidine bathing
- Antimicrobial/Antiseptic-impregnated catheters
- Chlorhexidine-impregnated dressings

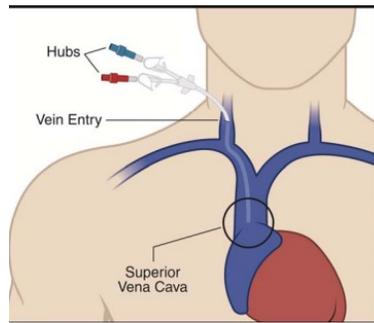
National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion



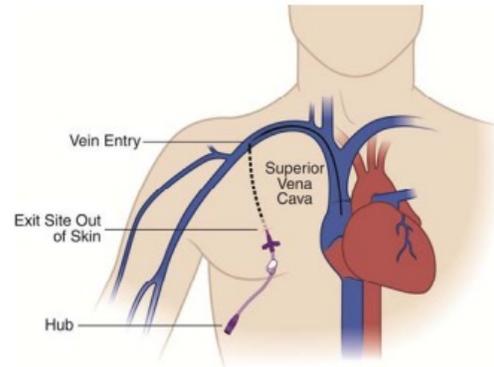
- **Remove unnecessary central lines**
 - Perform daily review to assess whether each central line is necessary, with prompt removal of unnecessary central lines
- **Follow proper insertion practices**
 - Perform hand hygiene before insertion
 - Adhere to aseptic technique
 - All operators/observers should wear a mask, cap, gown, sterile gloves
 - Sterile **full-body** drape should be placed on patient
 - Avoid insertion into femoral vein
- **Handle and maintain central lines appropriately**
 - Comply with hand hygiene
 - Scrub access port/hub prior to each use with appropriate antiseptic

Central Venous Catheter (CVC) Types

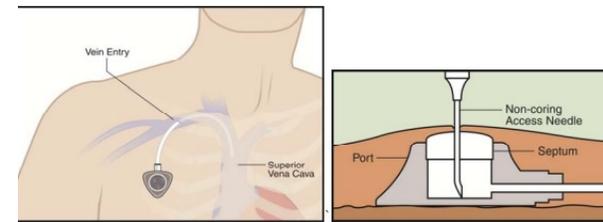
A CVC is an intravascular device that terminates at or close to the heart or one of the great vessels used to provide short, medium, and long-term access



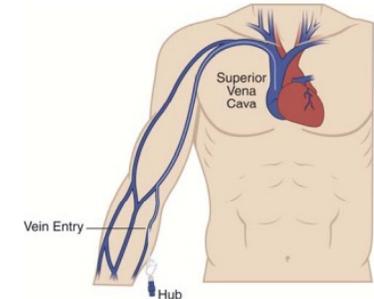
Non-tunneled CVC are used for short term therapy (<2 weeks) and in emergent situations. Examples include Triple Lumen and Trialysis Catheters



Tunneled CVC are passed under the skin to a separate exit point. This helps stabilize them making them useful for long term therapy. Examples include Hickman, Broviac, Goshorn, and other Permacath Hemodialysis Catheters

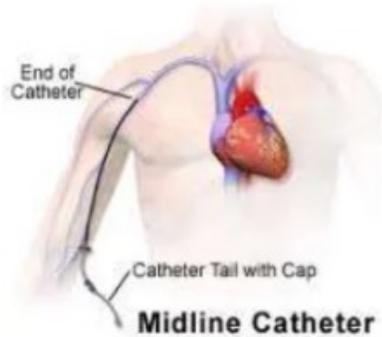


Implanted Ports are also tunneled under the skin. The port itself is placed under the skin and accessed as needed. They are useful for long term therapy.

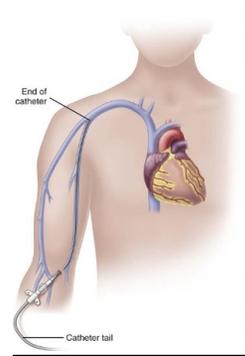


Peripherally Inserted Central Catheters (PICC) are inserted in a large peripheral (e.g., cephalic or basilic vein), and then advanced until the tip rests in the distal superior vena cava or cavoatrial junction

Possible Alternatives to CVCs for Short Term IV Access*



Midline Catheter is a long peripheral catheter, typically 3-11 inches long, inserted into the antecubital or upper arm vein; the tip terminates before the axillary vein. Midlines are used for short term therapy up to 30 days. Advantages of midlines include lower infection rates than CVCs and PICCs and high rate of first attempt placement



Extended Dwell Peripheral IV (EDPIV) is a long peripheral catheter, typically 3-11 inches long, inserted into the antecubital or upper arm vein; the tip terminates before the axillary vein. EDPIV are also used for short term therapy up to 30 days.

*Contraindications to both midlines and extended dwell peripheral IVs include patients requiring complex infusions, TPN administration or infusates incompatible with peripheral administration, invasive hemodynamic monitoring, and patients with CKD stage IIIB or higher

Assessing CVC Appropriateness and CVC Indications

Indications for CVCs include:

- Infusate incompatibility with peripheral administration or complex medications that cannot be given peripherally
- Invasive hemodynamic monitoring
- Administration of total parenteral nutrition (TPN)
- Hemodialysis or plasmapheresis
- Inadequate venous access
- Long term therapy e.g. chemotherapy, long term iv antibiotics
- Need for multiple, escalating vasopressors



Documenting CVC Line Indications

- CVC indication needs to be documented on each each CVC insertion on a procedure note
- CVC indication needs to be documented daily via a Best Practice Advisory (BPA)
- If a CVC is no longer indicated, providers must acknowledge the CVC is no longer indicated and will be removed
- BPAs are fired daily to the patient's treatment providers -- in order to have the BPAs reach the intended provider, each provider must assign themselves to their patients' treatment team

BestPractice Advisory - Pcp, Kiwi

This patient has an active Central Line. Please document an indication **OR** if no longer needed, click the acknowledgement reason.

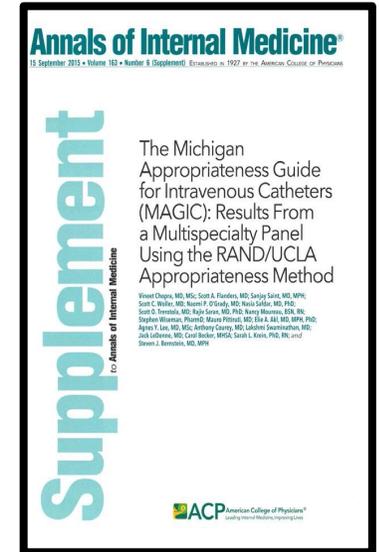
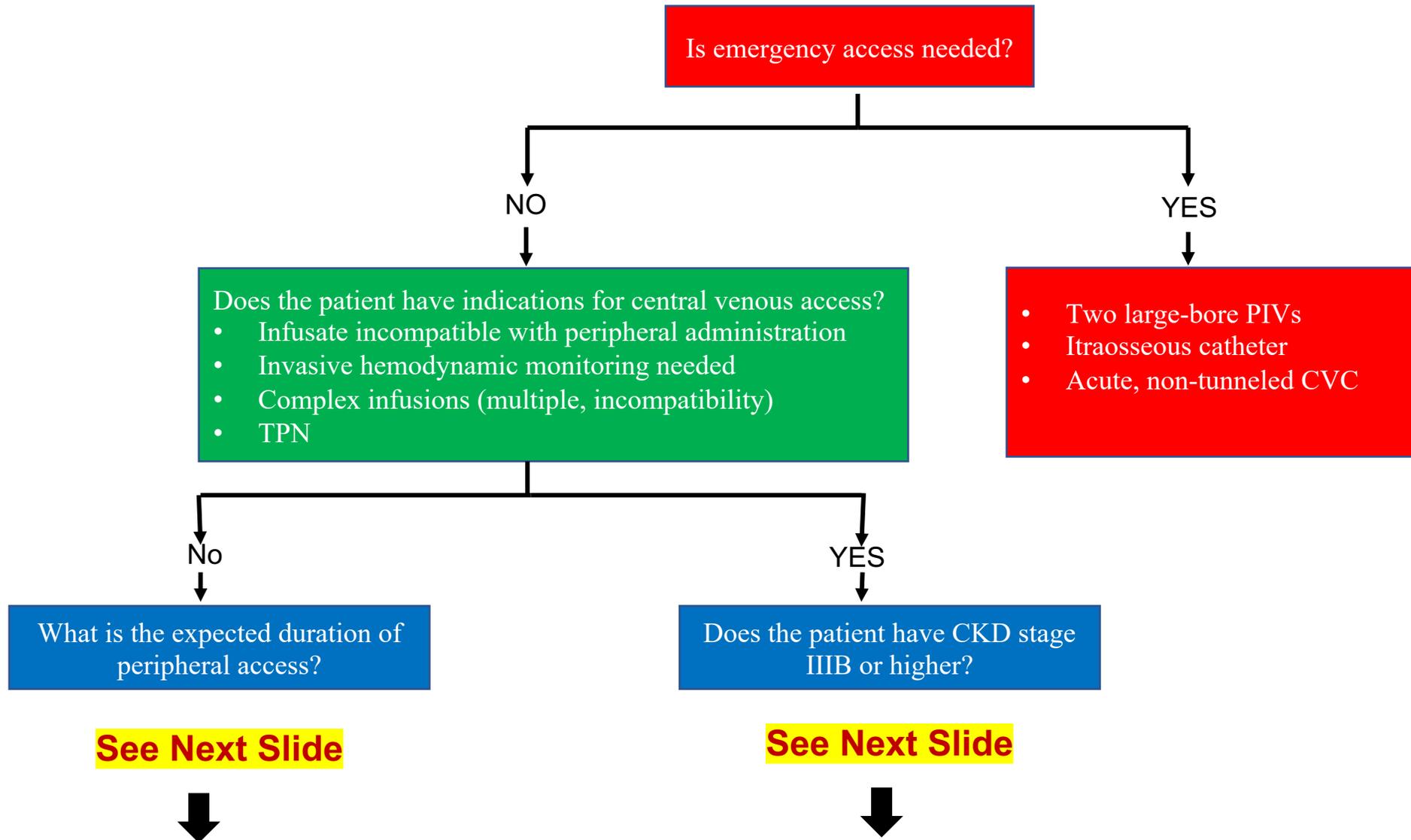
[Central Line Indications](#)

Acknowledge Reason

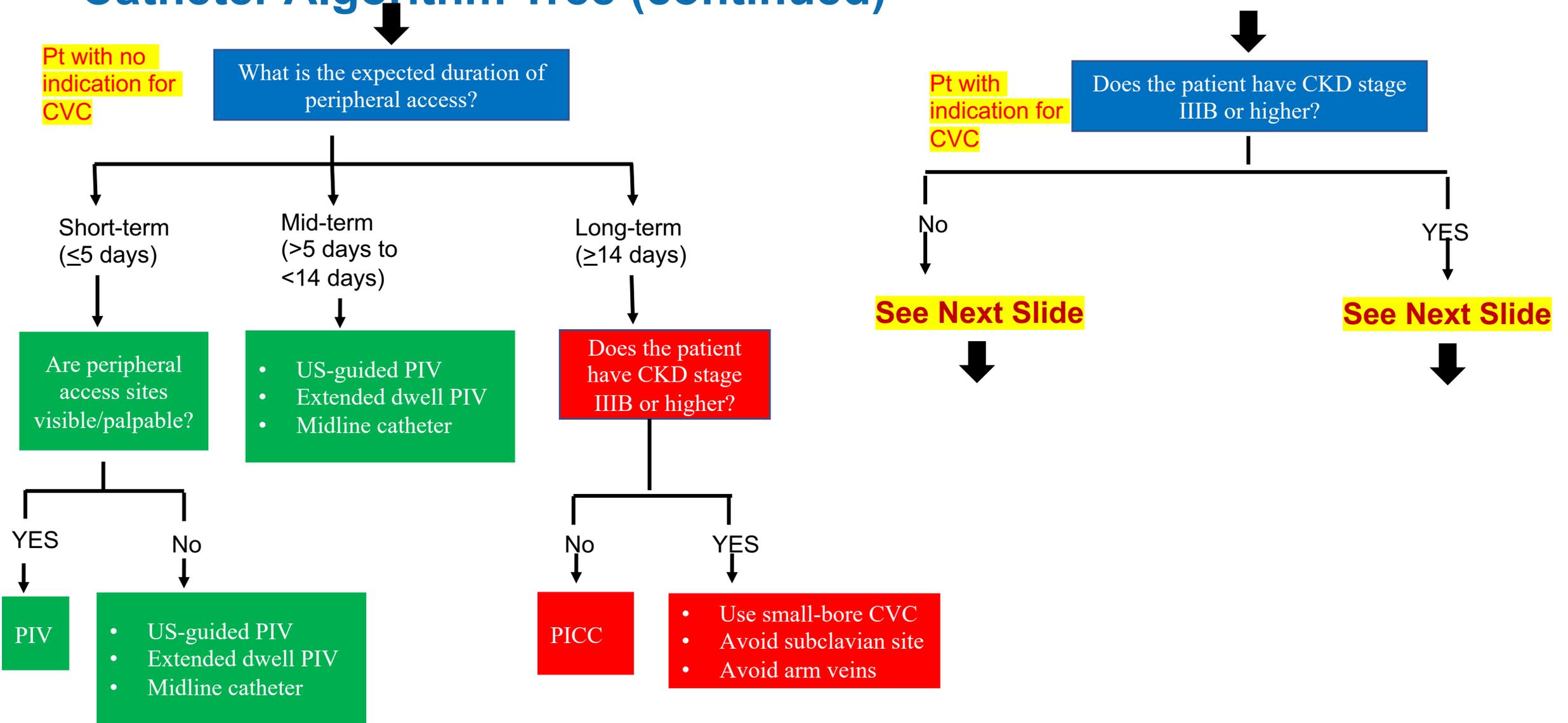
NO LONGER CLINICALLY INDICATED, will remo...

Accept Dismiss

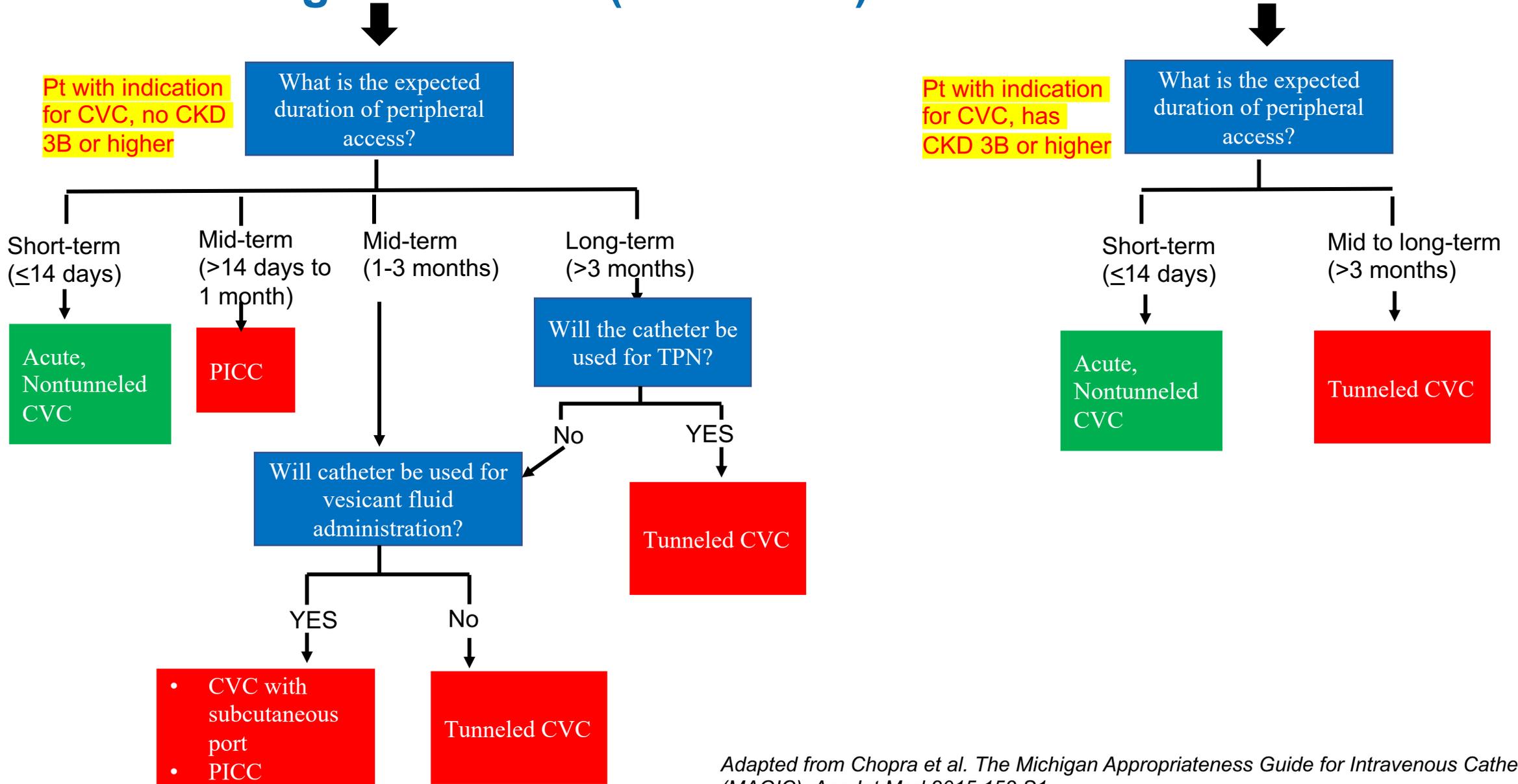
Approach to Selection of CVC: Using MAGIC Vascular Access Catheter Algorithm Tree



Approach to Selection of CVC: Using MAGIC Vascular Access Catheter Algorithm Tree (continued)

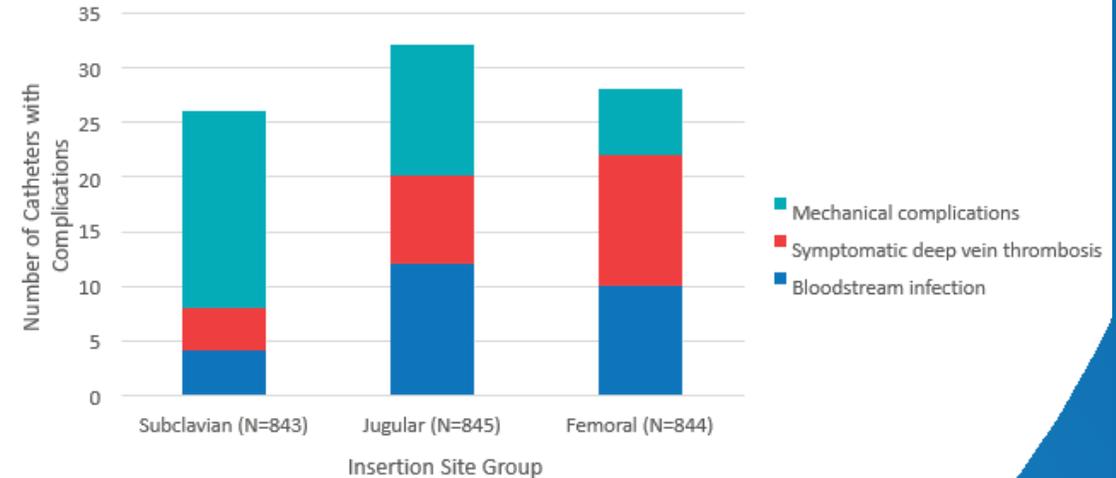


Approach to Selection of CVC: Using MAGIC Vascular Access Catheter Algorithm Tree (continued)



Selecting Appropriate CVC Site

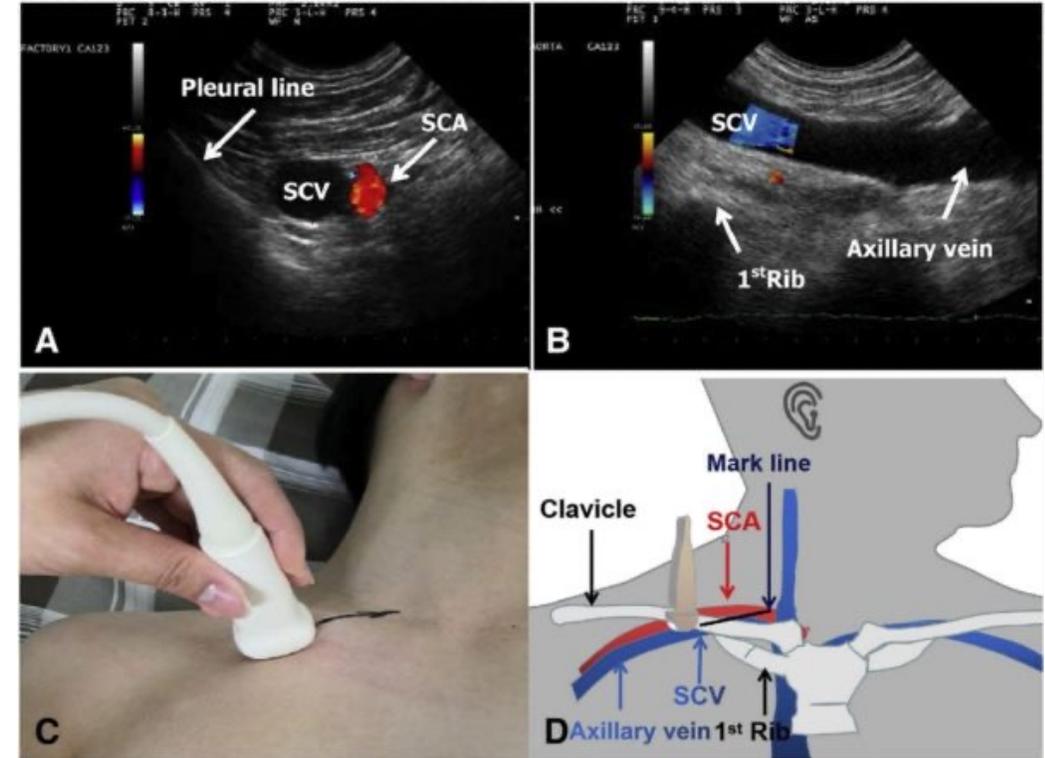
- Femoral site should be avoided due to higher bacterial density & difficulty in keeping site clean
- Jugular site may be problematic in keeping site clean, dry and intact due to oral secretions, & higher density of skin flora due to higher local skin temperature
- Subclavian placement is associated with lower risk for infection but highest risk of pneumothorax
- Must weigh the risk of infection vs. risk of mechanical complications in selecting CVC site
- Avoid subclavian site in hemodialysis patients & patients with advanced kidney disease to avoid subclavian vein stenosis



Parienti JJ et al. Crit Care Med, 2012

Using Ultrasound Guidance and Selection of Number of CVC Lumens

- Use ultrasound (US) guidance to place CVCs to reduce the number of cannulation attempts and mechanical complications
 - Note: US guidance should only be used by those fully trained in its technique
- Use a CVC with the minimum number of ports or lumens essential for the management of the patient to reduce infection risk



Preparing for CVC Insertion



- Comfort is Important
 - Ensure there is enough room around the patient/operator
 - Ensure table in proper spot
 - Raise bed for your comfort
 - Supervisor and nurse are available throughout procedure
 - US monitor is ready at view site
- Use Catheter kit bundle and have all supplies are ready



Best Practices for CVC Insertion

- Follow **UH Central line Insertion Checklist** – see next slide
- Perform **hand hygiene** prior to insertion
- Use maximal barrier protection (**cap, face shield, sterile gown, sterile gloves**)
- Perform skin antiseptis scrub with **CHG with alcohol**
 - If < 2 mos of age, use tincture of iodine, iodophor, or alcohol
- Adhere to aseptic technique
- Cover site with sterile dressing

- When adherence to aseptic technique cannot be ensured (emergent catheters), replace the catheter ASAP (and within 48 hours)



- Apply CHG antiseptis in back and forth motion for 30 seconds
- Let dry for 30 seconds

**UNIVERSITY HOSPITAL
Central Line Insertion Checklist**

Procedure Location:	Date:
Operator (person inserting the line):	Assistant (if applicable):
Supervisor (if applicable):	Person Completing the Form:
Note: Persons participating in procedure should apply PPE in this order: cap, face shield/mask, sterile gown, then sterile gloves. If just observing, apply a cap and face shield/mask.	
Catheter type (*see back for list):	
Site: <input type="checkbox"/> Subclavian <input type="checkbox"/> Jugular <input type="checkbox"/> Femoral <input type="checkbox"/> Peripheral	Side of Body: <input type="checkbox"/> Left <input type="checkbox"/> Right
Indication:	
Type of procedure: <input type="checkbox"/> Elective <input type="checkbox"/> Emergency <input type="checkbox"/> Re-position/Exchange <input type="checkbox"/> Other:	

Critical Steps: If there is a deviation from the process below, immediately notify the operator and **STOP** the procedure until corrected.

Before the Procedure				
	Yes	Yes, after reminder	No	N/A
Obtain informed consent? (except in emergent procedure)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Obtain Supervision if needed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify all necessary supplies at bedside?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perform time out?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Confirm handwashing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wears the required PPE:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operator: cap, face shield/mask, sterile gown and sterile gloves?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assistant: cap, face shield/mask, sterile gown and sterile gloves?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observer/Person Completing the Form: cap and face shield?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Position patient correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For Chest/EJ: Trendelenburg, unless contraindicated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Femoral: Supine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Apply CHG/alcohol for 30 seconds scrub, using back and forth strokes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For moist skin areas/femoral site allow for 2-minute scrub?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin prep allowed to dry 30 seconds prior to puncture?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For moist skin areas/femoral site allow 60 seconds for dry time?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
STOP THE PROCEDURE IF SITE NOT PREPPED CORRECTLY				
Use sterile technique to drape patient from head to toe?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Catheter primed with sterile normal saline in all lumens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local anesthetic and/or sedation used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CONTINUE ON OTHER SIDE

During the Procedure

Confirmation of venous placement prior to dilation of vein by ultrasound For Vascular team confirm venous placement with ultrasound and with VPS for PICC line insertion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Obtain qualified second operator after three unsuccessful attempts? For vascular team, if unsuccessful place an IR consult.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Re-apply CHG/alcohol for 30 second scrub, using back and forth strokes? For moist skin areas/femoral site allow for 2-minute scrub?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin prep allowed to dry 30 seconds? For moist skin areas/femoral site allow 60 seconds for dry time?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Apply adhesive glue?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Apply dressing with sterile technique?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintained sterile field for the entire procedure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

After the Procedure

Dressing dated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Prime and attach needless connectors to all lines?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flush and clamp all lumens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify placement?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Distribution instructions: Please complete this form and keep in the Central line cart binder. Infection Preventionist will collect on a weekly basis.

Additional Instructions

***Types of Central lines:**

- Dialysis Non-tunneled
- Dialysis Tunneled
- Non-Tunneled other than dialysis (e.g. TLC (Triple Lumen Catheter), Double Lumen, Single Lumen)
- PICC
- Tunneled, other than dialysis (Broviac, Hickman)

Skin Prep Procedure:

- Scrub the site with CHG/alcohol with friction for 30 seconds using back and forth strokes. Allow the area to dry for **AT LEAST** 30 second, before puncturing the site.
- **DO NOT** blot or wipe away the solution. If you blot or wipe away the solution, you must re-prep the site.
- If applied to moist areas or the femoral site, please scrub for 2 minutes using back and forth strokes and allow the area to dry for 60 seconds.

Post-insertion, re-application of CHG/alcohol:

As per the instructions for use for CHG/alcohol, the product is not effective if blotted or wiped away. CHG/alcohol must be re-applied after inserter wipes away blood or ultrasound gel post-insertion.

**UH Central Line
Insertion Checklist**

Monitoring for Infection Post CVC Placement

- Monitor the catheter sites visually when changing the dressing or by palpation through an intact dressing on a regular basis, depending on the clinical situation of the individual patient
 - If there is tenderness at insertion site, fever without obvious source, or other manifestations suggesting local or bloodstream infection, dressing should be removed to allow thorough exam of the site
- Have catheter site dressings replaced if dressings become damp, loosened, or soiled
- Encourage patients to report any changes in catheter site or any new discomfort

Take Home Points



- **Assess appropriateness and need for all CVCs**
 - Use MAGIC venous algorithm to help decide if a CVC is appropriate and which type of CVC is best
- **Alternatives to CVCs include peripheral IV catheters, extended dwell peripheral IVs, and midlines**
- **Select appropriate catheter site**
 - Avoid femoral site; weigh the risk of infection vs. risk of mechanical complications
- **Ensure proper aseptic insertion using maximal sterile barriers and ultrasound guidance**
 - Ensure alcohol containing CHG antisepsis
- **Remove CVCs as soon as possible**