Adult CVC Placement and Exchange

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care.

Note: This algorithm is used by Acute Care Procedures Team.

Coagulopathy Threshold

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Minimum platelet threshold</th>
<th>Threshold to infuse platelets during procedure</th>
<th>INR</th>
</tr>
</thead>
<tbody>
<tr>
<td>IJ</td>
<td>20 K/microliter</td>
<td>10-20 K/microliter</td>
<td>2</td>
</tr>
<tr>
<td>Subclavian</td>
<td>30 K/microliter</td>
<td>20-30 K/microliter</td>
<td>2</td>
</tr>
<tr>
<td>Femoral</td>
<td>20 K/microliter</td>
<td>10-20 K/microliter</td>
<td>2</td>
</tr>
</tbody>
</table>

APP = Advanced Practice Provider
ACCC = Acute Care Cancer Center
IR = Interventional Radiology
SVC = superior vena cava

1 Heart rate >110 bpm or < 60 bpm, oxygen saturation < 92% and systolic blood pressure < 95 mmHg or > 170 mmHg
2 Stage 3B or higher with glomerular filtration rate < 45 mL/minute

Are vital signs unstable? Yes

History of arrhythmias (i.e., atrial fibrillation)
History of pacemaker
Current anticoagulation medication use
History of blood clots to upper extremity central veins (axillary, IJ, subclavian, SVC)
History of radiation, surgery, trauma or lesion/mass/wound to neck, chest or access site, or any visible anatomical variants that may obscure landmarks

- Patient with renal disease, with or without dialysis and/or
- Platelets < 20 K/microliter
- Patient has no pertinent history or contraindications to procedure
- Hemodynamically unstable/new onset symptoms
- Symptoms of severe cough, chest pain, shortness of breath, fever, vomiting, diarrhea, etc.

- Discuss with primary team and on-call Vascular Surgery
- Consider deferring procedure especially if new-onset or unstable or
- Refer to Vascular Surgery, if needed

- See Implanted Cardiac Pacemaker and Defibrillator Management algorithm
- Line must be placed contralateral to pacemaker. Consult Cardiac Catheterization Lab, Vascular Surgery or IR if only ipsilateral side of pacemaker available.

See Peri-Procedure Management of Anticoagulants algorithm prior to procedure

Page thoracic fellow/Vascular Surgery to discuss the following:
- Safety of treatment
- Obtaining further imaging [venous ultrasound duplex study, CT chest obtained within 30 days (contact radiology for vasculature review)]
- If contralateral site is free of thrombus, then APP may attempt
- Referring case to Vascular Surgery, if needed

Consider contralateral site. If no other site available, consider utilizing alternate site for access after discussion with on-call Vascular Surgery and primary team.

- Consider IJ placement
- Consult Vascular Surgery if platelets < 10 K/microliter

Proceed to Patient Evaluation on Page 2. Also, find information for patients needing simultaneous port removal on Page 3.

- Inform primary team
- Send to ACCC for evaluation with nursing escort

- Contact primary team. If procedure cleared by primary team, discuss with Vascular Surgery.
- Consider having patient evaluated by ACCC or primary team
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**Diagram: Adult CVC Placement and Exchange**

A. **Patient evaluation for CVC placement or exchange**
   - Does patient exhibit any of the following: anxiety, uncooperative behavior, or language barrier?
     - Yes
     - No

   - Is patient alert and oriented?
     - Yes
     - No

   - Assess ability for patient to follow commands and stay stable for placement
     - Yes
     - No

B. **Ultrasound assessment**
   - Vein can be assessed, vein depth 2-5 cm
   - Vein flat
   - Is vein still flat?
     - Yes
     - No

   - Vein depth < 2 cm
     - Refer back to Box A
   - Vein depth > 5 cm
     - Request for IJ placement or refer to Vascular Surgery
   - Vein depth 2-5 cm
     - Discussion with primary team and schedule procedure to be done under conscious sedation if patient has anxiety or is unable to assume position for procedure
     - Strongly consider IJ placement
     - If subclavian placement is still indicated, limit attempts to 1 only by privileged APP. If attempt unsuccessful, refer to Vascular Surgery.

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     - Discussion with primary team and schedule procedure to be done under conscious sedation if patient has anxiety or is unable to assume position for procedure
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1 For CVC exchanges only, refer to information on wire placement within Box B
2 If language assistance is needed, an interpreter is required at bedside for duration of entire procedure
3 For pre-assessment and procedure, only use high level disinfected ultrasound probe that is covered with a sterile cover and sterile individual gel packs
4 Consider IJ placement or refer to Vascular Surgery for placement as needed

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Post procedure:
- Patient must await final chest x-ray read from radiology before being discharged from clinic
- Procedure performed under conscious sedation should have portable chest x-ray performed to rule out malposition prior to patient being woken up for reposition to occur immediately. In outpatient clinic areas, perform ultrasound of neck to rule out neck malposition for subclavian approach.

If post-procedure pneumothorax on chest x-ray, see Post Central Line Placement Pneumothorax Management on Page 4

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**Patient pending simultaneous CVC placement and port removal**

- **Central line placement contralateral to port removal side**
  - Proceed with central line placement first
  - Proceed with port removal (refer to Implanted and Tunneled Port and Catheter Removal algorithm)

- **Central line placement ipsilateral to port removal side**
  - Is central line placement successful?
  - Yes
    - Do not remove port-a-cath; consult Vascular Surgery for central line placement and port removal
  - No
    - For ipsilateral attempt, consider obtaining bilateral venous duplex ultrasound prior to placement to rule out obstruction
    - If attempting subclavian catheter placement on same side as IJ port, do not remove port first. Proceed with placing subclavian catheter first before port removal.
    - Do not attempt ipsilateral subclavian CVC placement with subclavian port as well as IJ CVC placement with IJ port
  - If patient has history of multiple attempts on each side (PICC line or port or catheter), obtain ultrasound prior to referral to Vascular Surgery

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Post Central Line Placement Pneumothorax Management

Pneumothorax found on post-line insertion chest x-ray

- Contact via page:
  - On-call surgery fellow to evaluate patient and staff with on-call surgery attending
  - Primary team
- Contact via email:
  - APP supervisor and proceduralist medical director

Is patient symptomatic and/or hemodynamically unstable?  

Yes

- APP proceduralist and Vascular Access Team (VAT) nurse to perform STAT IR consult for pigtail catheter placement
- Admit patient

No

Place patient in Clinical Decision Unit (CDU) for monitoring

Perform chest x-ray at 1 hour and 3 hour intervals after diagnosis

Is pneumothorax 20% or less and/or 2 cm or less?

Yes

- On-call surgical attending must determine whether to admit to:
  - Vascular Surgery service
  - Primary team’s service
  - General Internal Medicine (per the determination of the Admitting Service Workflow (#ATT1942) within the Clinician Scope of Services and Responsibilities Policy [#CLN0598])

No

Consult IR for pigtail catheter placement

Schedule repeat chest x-ray the subsequent morning with ongoing evaluation

On-call surgical attending must determine whether to admit to:

- Vascular Surgery service
- Primary team’s service
- General Internal Medicine (per the determination of the Admitting Service Workflow (#ATT1942) within the Clinician Scope of Services and Responsibilities Policy [#CLN0598])

Proceduralist APP should round on inpatient until discharged home or delegate to scheduled ITT proceduralist on the subsequent day

Normal chest x-ray result

Discuss with surgical fellow for clearance

Abnormal chest x-ray result

Patient scheduled through CDU for repeat chest x-ray the subsequent morning

Confirm with VAT nurse for STAT IR consult for pigtail catheter placement

Place patient in Clinical Decision Unit (CDU) for monitoring

Perform chest x-ray at 1 hour and 3 hour intervals after diagnosis

Is pneumothorax 20% or less and/or 2 cm or less?

Yes

No

Consult IR for pigtail catheter placement

Schedule repeat chest x-ray the subsequent morning with ongoing evaluation

Note: This algorithm is used by Acute Care Procedures Team

1 Heart rate > 110 bpm or < 60 bpm, oxygen saturation < 92% and systolic blood pressure < 95 mmHg or > 170 mmHg
SUGGESTED READINGS


Continued on Next Page
SUGGESTED READINGS - continued


Marik, P., Flemmer, M., & Harrison, W. (2012). The risk of catheter-related bloodstream infection with femoral venous catheters as compared to subclavian and internal jugular venous catheters: A systematic review of the literature and meta-analysis. *Critical Care Medicine, 40*(8), 2479-2485. https://doi.org/10.1097/CCM.0b013e318255d9bc


SUGGESTED READINGS - continued


This practice consensus statement is based on majority opinion of the Acute Care Services experts at the University of Texas MD Anderson Cancer Center for the patient population. These experts included:

Ivy Cocuzzi, PA-C (Acute Care Services)\textsuperscript{T}
Wendy Garcia, BS\textsuperscript{*}
Marina George, MD (Inpatient Medical Practice)
Susanna Girocco, PA-C (Acute Care Services)
Tam Huynh, MD (Thoracic & Cardiovascular Surgery)
Christina Perez\textsuperscript{*}
Amy Pai, PharmD\textsuperscript{*}
Kimberly Tripp, MBA, BSN, RN (Acute Care Services Administration)

\textsuperscript{T} Core Development Team
\textsuperscript{*} Clinical Effectiveness Development Team