CONEMAUGH MEMORIAL MEDICAL CENTER
GRADUATE MEDICAL EDUCATION POLICY

CENTRAL VENOUS CATHETER (CVC) PLACEMENT

PURPOSE:

Memorial Medical Center (MMC) is committed to excellent patient care, with the highest priority towards patient safety and excellent clinical outcomes. As a graduate medical education training site, MMC will standardize the basic education, competency assessment, supervision and procedural methods for medical students, resident physicians inserting central venous catheters (CVCs) under this policy. This policy will guide the education of trainees in the use of proper sterile technique, anatomical landmarks and ultrasound guidance when inserting CVCs. The CVCs covered by this policy are all percutaneously inserted central catheters including large bore central catheters such as dialysis and resuscitation catheters. This policy supports the routine use of ultrasound guidance for internal jugular and femoral venous sites of CVC placement unless the clinical urgency and/or immediate unavailability of ultrasound precludes sonographic guidance. At times, extraordinary clinical circumstances or clinical judgment of the attending physician may dictate that different approaches to central line placement may be utilized. It is expected that these will be an unusual occurrences.

SCOPE:

This policy outlines the education, training and supervision of all trainees involved in CVC insertion. All postgraduate medical trainees performing CVC placement in their clinical duties will be trained in anatomic landmarks and ultrasound guided CVC insertion techniques as appropriate to location. This policy designates the minimum standard by which a resident or fellow will be educated to place CVCs, when they may place central lines WITHOUT direct supervision, and who may supervise and teach central line placement.
This policy is applicable for ALL trainees, including transferring residents/fellows, and visiting residents/fellows.

IMPLEMENTATION:

The implementation of this policy is the responsibility of the GMEC and residency Program Directors.

DEFINITIONS:

Trainee: Any postgraduate trainee in the institution, including residents, fellows, and students.

Supervising Attending: Attending physician skilled in CVC insertion and credentialed by the MMC staff to perform this procedure.

Clinical Supervisor: Supervising Attending or all trainees who have reached Teaching Competency for CVC insertion.

Direct Supervision: Supervision of the procedure with the Clinical Supervisor in the room with the trainee.

Oversight: The attending physician is available to provide review of procedures/encounters with feedback provided after care is delivered but is neither physically present nor available for the procedure.

Learner, Competency, Teaching (Previously Level 1, 2 or 3 Training): Designation of varying levels of training designed to lead to the achievement of varying levels of proficiency in the insertion of CVCs. Section 5 of this policy defines the required training and supervision at each level.

CVC sites: Subclavian, Internal jugular, femoral

Difficult patient: Any patient in whom a CVC placement is being considered and who is at increased risk of complications. Trainees in Learner phase are not to attempt to place CVC in this group of patients and even Trainees deemed competent are encouraged to have a Clinical Supervisor immediately available. The following are examples of conditions which may make the CVC placement difficult:

- Extremes of body habitus BMI<20 or >40 □
- Coagulopathy (platelets < 50,000, INR > 1.5, APTT> 50 seconds)
- Unresuscitated shock with inadequate vein filling noted by completely collapsed vessel on ultrasound
- Altered anatomy (prior radiation therapy or prior insertion at this site)
- Previous surgery at or near the intended vein location
- Agitated patient/lack of cooperation in being immobile or positioned correctly
- Previous thrombosis of intended vein

Large Bore Catheter: CVCs greater than 7.5 fr such as those used for hemodialysis (commonly referred to as Vas Caths) or rapid resuscitation from hypovolemic or septic shock (commonly referred to as trauma catheters).

Seldinger Technique: A method of percutaneous insertion of a catheter into a blood vessel or space. A needle is used to puncture the structure and a guide wire is threaded through the needle; when the needle is withdrawn, a catheter is threaded over the wire; the wire is then withdrawn, leaving the catheter in place.

Site Specific competency: Femoral and Internal Jugular (IJ) sites are routinely placed using ultrasound guidance while subclavian lines are placed using anatomic guidance and competency with one approach does not indicate competency with other. For the purposes of MMC, Femoral and IJ approach will be considered together and subclavian separately. Further, a trainee can be certified at just the Femoral/IJ sites or at All Sites based on demonstrated successfully supervised CVCs placed at each site.

PROCEDURE TO OBTAIN COMPETENCY LEVELS:

A. Learner phase

1. **Definition**: Trainee has completed requisite educational material referenced (2ai/ii) for CVC insertion and is placing CVC under direct supervision. The goal is to

progress to the competency phase and be able to place lines independently (Indirect or Oversight supervision) after a minimum of ten (10) lines.

2. **Requirements:**
   a. Must be done prior to any attempt to place CVC in a patient:
      i. MMC Central Line training course during orientation with verification of proficiency (VOP) passed or equivalent as determined by the program director if unable to attend orientation.
         a) See Appendix C
      ii. For Residents Rotating in the ICU, attendance at a training session in the Medical Skills Learning Center (MSLC) the month prior to their rotation.

3. **Appropriate Patient Selection:** The following are **Not** appropriate patient for a Learner to place a CVC
   a. Difficult patient
   b. Large Bore Catheter
   c. Patient in extremis or who placement must be accomplished in a limited time frame

4. **Supervision:** Direct Supervision is required for all lines and may be provided by faculty with appropriate credentialing or Senior resident who has attained Teaching Phase in the specific site utilized (Clinical Supervisor).

   All CVC should be placed following the MMC standardized CVC insertion guideline. (See Appendix A)

B. Competence phase

1. **Definition:** Trainee has completed all the training steps in the Learning phase, has had a CVC competency attestation completed (Appendix B) and has been approved by his/her Residency Program Director (PD) or faculty designee to place CVC with indirect supervision. The goal of this phase is to develop further skill in placing central lines independently with the potential to progress to the Teaching phase. However, this may be the terminal achievement for a trainee, they are competent to place central venous catheters independently and be credentialed upon graduation as competent in this procedure by specific sites, but are not considered competent to teach the procedure.

2. **Requirements:**
   a. Successful placement of 10 Central lines (completed during the learner phase)
   b. CVC Competency attestation (See Appendix B)
   c. Program Director certification of meeting Competency Phase

3. **Appropriate patient selection**
   a. Difficult patients: Trainee may place CVC on these patients with direct or indirect supervision BUT SHOULD HAVE direct supervision immediately available

b. Large Bore Catheters: May be placed but require Direct Supervision by appropriate Supervisor until a total of five (5) at any site have been successfully placed. See below Section E.

4. **Supervision:** Oversight or Indirect supervision by qualified attending physician. While not required, Residents should seek direct supervision when available for continued learning and progression of skill during this phase.

C. Teaching Phase

1. **Definition**: Trainee may serve as a Supervisor to a Learner. The goal is to develop competency and expertise in supervision and teaching central line placement including corrective actions and troubleshooting and appropriate patient selection for learner phase trainees
   a. Trainees is proficient in central line insertion in all circumstances in site specific manner, see below for site specific competency.

2. **Requirements**:
   a. Resident physician who has completed the competency phase
   b. Successful insertion of a minimum of total of 15 CVC placements at femoral and IJ sites. Subclavian placement is unique (see c)
   c. Subclavian Exception: At least FIVE successful CVC placements at the subclavian site are required to be a Teacher Phase for CVC placed at THIS SITE. e.g. trainee may have 15 total lines and if only 2 are Subclavian, the trainee would need 3 additional lines to teach/supervise at this site.
   d. The trainee must be approved by his/her PD to move to Teaching Competency.

Note: Teaching Competency can be achieved at only the Femoral/IJ sites or at All Sites

3. **Patient Selection:** All patients and all sites though residents in Teaching phase should continue to seek out guidance and support in difficult or unusual circumstances during their training.

4. **Supervision:** Indirect or Oversight supervision is allowed.

D. Large Bore Catheter Placement Exception:

The goal for this exception is to be able to independently place large bore catheters safely and competently. They are considered separate from routine multi-med type CVC catheters due to their increased risk for complications.

1. **Catheter definition:** CVC larger than 7.5 Fr, which Includes Dialysis catheters, Resuscitation catheters (Arrow, trauma catheter) and Cortis Introducer/sheath introducer.

2. **Requirements:**
   a. Be in the competency phase of CVC placement
   b. The trainee must successfully place a minimum of five (5) large bore catheters under direct supervision by an Attending Physician or Teacher Phase resident prior to placing these CVCs.
   c. The trainee must be approved by his/her PD to move to Oversight Supervision for Large Bore Catheters

3. **Patient Selection**: Large Bore Catheter have a demonstrated higher morbidity and are not considered appropriate for placement by someone in the Learner Phase:
   a. Preferred sites for large bore catheter placement are Femoral/ or Right IJ

4. **Supervision:** Direct Supervision by Attending or Teacher Phase Resident who has completed 5 Large Bore CVC is required until 5 Large Bore CVC are placed (2b/c).

E. Residents Entering Graduate Medical Education Programs at the PGY – 2 level, Transferring Residents, Visiting Residents and Fellows:

1. The trainee needs to provide written documentation from their prior residency program director (residents entering at the PGY – 2 level, transferring residents or fellows) or current residency program director (visiting residents) of successful completion of comparable training and supervision regarding CVC insertion (including the number of CVC insertion) to their program director.

2. All trainees must demonstrate competency in the insertion of at least one (1) CVC at the bedside under direct supervision by a qualified physician.

3. All trainees must be approved by residency/fellowship Program Director.

4. Trainees who have not successfully completed comparable training / supervision regarding CVC insertion, or if not competent on demonstration, must complete the entire program for independent CVC insertion.

F. Tracking and documentation

All Central Lines will be documented through the CVC procedure navigator in EPIC. The appropriate information of the catheter placement attempt along with the required quality indicators must be filled out on every attempted CVC placement. Failure to do so will result in suspension of the trainee's CVC insertion privileges until remediation is completed. Training on documentation of CVC is part of the Central Line Course.

Following review of CXR, a clinical note or progress note must be entered noting that the CXR was reviewed, presence or absence of complications, and location of the tip of the catheter documented.

All central line procedures must also be entered into New Innovations for tracking and competency assessment purposes.

G. Competency Assessment:

Once the requirements for Competence are achieved, trainees may send a Competency Assessment Form to the qualified attending who was present for the entire procedure. Trainees should complete the entire procedure without faltering or assistance to receive a satisfactory score. The supervising attending is responsible for determining independent practice of the individual resident. (See Appendix B)

Any qualified attending (per CMC medical staff privileges) may make this assessment for any trainee on any service participating in the central line training program.

H. Escalation

1. A qualified supervising physician (Attending or Supervisor) must take over the procedure if:
    a. If after two (2) attempts a trainee has failed to successfully insert the CVC
    b. unless emergently necessary and attending physician notified
    c. If an arterial puncture has occurred on ANY attempt
    d. If there is any suspicion that a pneumothorax may have occurred on ANY attempt or the patient is in any signs of medical distress felt to be due to placement of the CVC.
    e. Any complication, suspected complication and need to escalate should be reported on the CVC procedure template.

2. Escalation may not be assumed by a qualified trainee at Competency level but rather the attending or trainee at Teaching Competency level.

For additional escalation procedures, please see Appendix A.

Appendix A: Standard Central Venous Catheter (CVC) Insertion

This policy is intended to promote patient safety during the placement of routine central venous catheters. This policy is not intended as a substitute for the clinical judgment of an attending physician involved in a CVC placement.

A. Indications: Clinical indication and reasoning of site must be documented after the procedure in the EPIC CVC documentation tool.

B. Difficult Patients or Sites: A resident at Learner Phase must have an attending or resident at Teacher Phase assess the patient to determine level of difficulty in CVC insertion prior to initiating the procedure. Competency Phase residents should communicate this assessment, specifically identifying any complicating conditions directly to the supervising attending prior to initiating the procedure.

C. Trainees at Competency Phases (Learners are not permitted to perform) must notify the supervising clinician prior to CVC placement or have a qualified physician (attending or competency level 3) provide direct supervision if the following conditions are present:

a. Agitation/lack of cooperation in being immobile or positioned correctly
b. Shock states with inadequate vein filling noted by completely collapsed vessel on ultrasound
c. Previous thrombosis of intended vein Extremes of body habitus (BMI <20 or >50)
d. Coagulopathy (platelets < 50,000, INR > 1.5, APTT> 50 seconds)
e. Previous surgery at or near the intended vein location
f. Previous radiation at the proposed site of CVC insertion
g. Previous CVC insertion at the intended site

D. Site Insertion Selection: Appropriate site selection is dependent on the particular clinical situation and is best determined by the clinicians' experience with central line placement. At times, clinical circumstances may dictate that approaches to central line placement that diverge from the MMC Central Line Guidelines be utilized. It is expected that this will be an unusual occurrence

E. PREPARATION

1. The patient on whom the procedure is being performed is to be identified with two identifiers per hospital protocol with appropriate consent obtained, the site to be canalized identified, and risk factors for complications assessed.

2. The equipment required for insertion of the CVC is to be present before starting the procedure.

3. Prior to the application of sterile precautions the clinician should use ultrasound as indicated above (on IJ and femoral sites) to determine:

a. Vascular anatomy and location of the target vessel with ultrasound. The provider must be able to reliably distinguish the artery from the vein using anatomy, location, and compressibility and/or Doppler.
b. Demonstrate the patency of the target vessel

4. A qualified supervisory physician (based on the trainee's level of competency) must be identified prior to starting the procedure. This qualified physician must be aware of the procedure prior to any attempt, unless the placement is a true emergency (e.g. code blue, profound shock). Anticipated site selection, patient-related difficulties, and appropriateness for CVC placement must be reviewed with the supervising physician.

5. An attending physician responsible for the placement must also be identified and documented in the medical record. The attending physician should be notified prior to placement unless urgency of the clinical situation precludes it, at which time the attending will be notified immediately after placement.

F. PROCEDURE (routine, non-emergency CVC insertion)

1. The patient on whom the procedure is being performed is to be identified per the protocol. A time out will be performed prior to the procedure.

2. Personal protective equipment that fulfills sterile precautions will be utilized: sterile gown, mask, cap, and sterile gloves. A sterile ultrasound probe cover is required even if a second clinician will provide ultrasound assistance.

3. An initial prep of Hibiclens/chlorhexidine should be applied and then the patient draped appropriately.

4. The clinician is expected to maintain sterile technique throughout the procedure. If sterile technique is accidentally broken, the clinician should stop the procedure and restart sterile preparations as clinically indicated (e.g. replace gloves, obtain second sterile instrument/tray.)

5. The clinician will deliver local anesthesia to completely anesthetize the insertion and secondary securing site.

6. The clinician will identify anatomical landmarks and then sonographically reassess the anatomy, location, and patency of the target vessel. The clinician will correctly identify the position/location of introducer needle.

7. Under direct ultrasound guidance, (IJ and femoral) the clinician should puncture the vein, determine return of dark venous blood with non- pulsatile flow, and advance the wire into the vessel only if no resistance is met. If pulsatile or bright red blood is returned, stop the procedure and refer to escalation guidelines.

8. With the needle and wire in place, the clinician should sonographically confirm that the wire is in the venous lumen by visualizing the artery and vein simultaneously. The following views are recommended:
   a. Demonstrate collapsibility of the vessel where the wire is located
   b. Use flow and Doppler to document venous flow
   c. Follow the wire down the vessel, visualizing the target sign
   d. The probe is then switched to the longitudinal view to again visualize that the wire is not cross-threaded into adjacent artery.

9. If the wire is correctly located, the clinician should proceed using the standard Seldinger technique
   a. If there is concern for INAPPROPRIATE placement, proceed to section G. Special techniques for confirmation of venous puncture.
   b. If there is an arterial puncture, proceed to section I. IN CASE OF A SUSPECTED ARTERIAL PUNCTURE DO NOT dilate the vessel.
   c. An ABG can be sent off for confirmation about venous placement

10. After placement of the catheter: flush all ports with normal saline, secure/suture the CVC in place.

11. The clinician should clean the insertion site following procedure with Hibiclens/chlorhexidine

12. The clinician must apply antibiotic disk, or similar infection control measures unless contraindicated

13. The clinician (or sterile designee/nurse) must apply sterile central line dressing

14. The clinician is encouraged to subsequently use ultrasound to document the absence of a pneumothorax

15. The clinician is encouraged to electronically archive or print hard copy images for QA review and reimbursement.

16. The clinician must order post-procedure chest radiograph (Stat, Radiologist to read immediately) for all intrathoracic lines: (subclavian, infraclavicular and supraclavicular approach and internal jugular CVCs.)

G. TECHNIQUES FOR CONFIRMATION OF VENOUS PUNCTURE:

In addition to a chest x-ray which is used for intrathoracic CVCs placement, the position of the line should be verified by one of the following methods to confirm venous placement of the line:

1. Venous manometry (visual or monitor)
2. Blood gas analysis
3. Catheter identified in vein using ultrasound

Trainee must inform the supervising physician about any abnormal results of for the above tests.

H. USING THE CVC

1. If Section F above is performed appropriately and line placement is verified according to Section G, the line may be used. In cases of clinical emergency, the line may be utilized without the above confirmation techniques based on the clinical judgment of the physician.

2. Once correct placement of the CVC is confirmed, the physician must document this in EPIC and inform nursing that the CVC may be used for clinical care.

I. IN CASE OF A SUSPECTED ARTERIAL PUNCTURE:

1. Have somebody immediately call the supervising physician if he/she is not present in the room.

2. Remove the guide wire and/or needle, apply pressure for 5 minutes if the patient is not anticoagulated. If the patient is anticoagulated, apply pressure as per the direction of the supervising physician.

3. Perform secondary attempts at another site with direct supervision by a qualified physician or a teaching level supervisor.

J. IN THE CASE OF ARTERIAL DILATION with a central line of 7.5 f or greater:

1. **Do not remove the line!**

2. Immediately notify supervising attending and request stat Vascular Surgery consultation

K. COMPLICATIONS (OR SUSPECTED COMPLICATIONS)

1. Persistent site bleeding: notify supervising physician or teaching level supervisor, apply pressure to site if not contraindicated. Consider blood product replacement (platelets, factor) in consultation with attending physician or teaching level supervisor.

2. Pneumothorax: For evidence of tension pneumothorax, clinician should perform immediate appropriate needle decompression. If the attending physician is not qualified to place/supervise tube thoracostomy insertion, obtain stat consultation from

the ICU service, general surgery or cardiothoracic surgery, the emergency medicine attending (if in the ED) or inpatient attending if on the floor and the attending is qualified to perform a tube thoracostomy. For any non-tension pneumothorax, consult as appropriate. Consider calling a rapid response.

3. Persistent pain: Notify attending physician. Consider reapplication of local anesthesia or CVC removal.

Appendix B. Competency attestation form to be sent to the attending/supervising physician by the resident prior to insertion:

Resident X has placed at least 10 Central Venous catheters successfully and is now eligible for competency phase certification in CVC placement. Achieving this level allows them to place CVC independently and without direct supervision. I have directly observed resident X performing this CVC and certify they followed the CVC placement check list and attest to their competency and certify them as capable of safely performing CVC placement with only indirect supervision.

Yes

No (No requires comment): Please comment on areas resident needs to remediate before placing central lines with indirect supervision

(Check list)

1. Obtained informed consent

2. "TIME-OUT": Identify patient using two valid patient identifiers
   "TIME-OUT": Review patient allergies
   "TIME-OUT": Confirm procedure to be performed, including site and side of patient

3. Care Provider and all assistants wear caps and masks

4. Sanitize hands

5. Select appropriate site of venipuncture and visualize the vein using ultrasound (femoral and internal jugular

6. Prepare venipuncture site with chlorhexidine

7. Operator should now don sterile gown and gloves and then place on patient a sterile drapes

8. Identify Anatomical Landmarks appropriately

9. Reconfirm target vessel location by Ultrasound (femoral and IJ)

10. Anesthetize area using 1% Lidocaine

11. Cannulate the target vessel using landmarks and ultrasound assistance when appropriate

12. Venipuncture successful in 2 or less attempts

13. Confirm vessel entry by aspiration of blood

14. Insert J wire into needle, advancing wire without resistance, watch for ectopy

15. Confirm wire in target vessel with ultrasound using multiple views when appropriate and removes needle

16. Stab-incision with a scalpel at the wire entry site

17. Dilate the catheter tract using the dilator then remove dilator

18. Insert catheter over-the-wire to its appropriate length

19. Remove wire and make sure it is intact. Close the clamp on the port promptly after removing the wire

20. Attach a 10ml syringe to the distal port and attempt to aspirate blood. If successful, follow this by flushing the port with 5-10 cc of saline. Repeat for other ports.

21. Suture catheter in place.

22. Re-clean surgical site to remove all excess blood and apply another chlorhexidine wash

23. Place Biopatch at cannulation site and cover via an occlusive dressing

24. Use Ultrasound to check for the presence of Pneumothorax for IJ and SC placed catheters

25. Verify location of venous location by at least one confirmatory methods other than x-ray

26. Order a STAT, radiologist to read immediately portable CXR for all SC and IJ line placement or attempts.

27. Complete catheter insertion documentation in the medical record including logging in the CVC EPIC navigator

28. CRITICAL STEP: sterile field maintained?

29. CRITICAL STEP: if after 2 unsuccessful attempts (except if emergent), was escalation protocol followed?

Signature _____ Date_____

Appendix C

Lippincott: Central venous access catheter insertion
(Advanced practice)

https://procedures.lww.com/lnp/view.do?pId=3707798&disciplineId=4939

VOP RUBRIC FOR MODULE IV Central Venous Lines

Resident:
Evaluator:
Date: Must indicate that they have read Chapter 12, Intravascular Devices in Principles of Critical Care (AccessSurgery)

Subclavian Access				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Fails to Prep the patient or sets up the field efficiently and cannot use at least one technique (U/S or Landmarks to accurately) place the CVL	Preps the patient and sets up the field efficiently but cannot use at least one technique (U/S or Landmarks to accurately) place the CVL	May, may not or incompletely discusses patient positioning, use of rolls or bumps. Indicates that the patient is prepped. May or may not indicate sterile technique and universal precautions. Sets up the field efficiently. Uses both U/S (if available) and landmarks to accurately place the CVL. Discusses some of the four common procedure related complications (arterial puncture, pneumothorax, air embolism, and arrhythmia), but does not or incompletely discusses maneuvers to minimize their occurrence and how to treatment these complications.	Discusses patient positioning, use of rolls or bumps. Discusses sterile technique and universal precautions. Discusses prepping the patient. Sets up the field efficiently. Uses both U/S (if available) and landmarks to accurately place the CVL. Discusses some of the four common procedure related complications (arterial puncture, pneumothorax, air embolism, and arrhythmia), maneuvers to minimize their occurrence and how to treatment these complications. Does not or incompletely discusses the advantages and disadvantages of the subclavian approach. Incompletely or does not discuss which approach is associated with the least and most infections complications. Does not or incompletely discusses supraclavicular	Discusses patient positioning, use of rolls or bumps. Discusses sterile technique and universal precautions. Discusses prepping the patient. Sets up the field efficiently. Uses both U/S (if available) and landmarks to accurately place the CVL. Discusses the four common procedure related complications (arterial puncture, pneumothorax, air embolism, and arrhythmia), maneuvers to minimize their occurrence and how to treatment these complications. Discusses advantages and disadvantages of the subclavian approach. Discusses which approach is associated with the least and most infections complications. Reviews the long-term complications associated with central venous access and how to minimize these occurrences. Discusses the

			approach for subclavian vein.	alternative supraclavicular approach for subclavian and in what circumstances would one consider this approach.
Internal Jugular Access				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Fails to Prep the patient or sets up the field efficiently and cannot use at least one technique (U/S or Landmarks to accurately) place the CVL	Preps the patient and sets up the field efficiently but cannot use at least one technique (U/S or Landmarks to accurately) place the CVL	May, may not or incompletely discusses patient positioning, use of rolls or bumps. Indicates that the patient is prepped. May or may not indicate sterile technique and universal precautions. Sets up the field efficiently. Uses both U/S (if available) and landmarks to accurately place the CVL. Discusses some of the four common procedure related complications (arterial puncture, pneumothorax, air embolism, and arrhythmia), but does not or incompletely discusses maneuvers to minimize their occurrence and how to treatment these complications.	Discusses patient positioning, use of rolls or bumps. Discusses sterile technique and universal precautions. Discusses prepping the patient. Sets up the field efficiently. Uses both U/S (if available) and landmarks to accurately place the CVL. Discusses some of the four common procedure related complications (arterial puncture, pneumothorax, air embolism, and arrhythmia), maneuvers to minimize their occurrence and how to treatment these complications. Does not or incompletely discusses the advantages and disadvantages of the internal jugular vein approach. Incompletely or does not discuss which approach is	Discusses patient positioning, use of rolls or bumps. Discusses sterile technique and universal precautions. Discusses prepping the patient. Sets up the field efficiently. Uses both U/S (if available) and landmarks to accurately place the CVL. Discusses the four common procedure related complications (arterial puncture, pneumothorax, air embolism, and arrhythmia), maneuvers to minimize their occurrence and how to treatment these complications. Discusses advantages and disadvantages of the internal jugular vein approach. Discusses which approach is associated with the least and most infections complications.

			associated with the least and most infections complications. Does not or incompletely discusses the posterior approach for internal jugular vein.	Reviews the long-term complications associated with central venous access and how to minimize these occurrences. Discusses alternative posterior approach for internal jugular and in what circumstances would one consider an alternative approach.
Femoral Vein Access				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Fails to Prep the patient or sets up the field efficiently and cannot use at least one technique (U/S or Landmarks to accurately) place the CVL	Preps the patient and sets up the field efficiently but cannot use at least one technique (U/S or Landmarks to accurately) place the CVL	May, may not or incompletely discusses patient positioning. Indicates that the patient is prepped. May or may not indicate sterile technique and universal precautions. Sets up the field efficiently. Uses both U/S (if available) and landmarks to accurately place the CVL. Discusses some of the three common procedure related complications (arterial puncture, air embolism, and retroperitoneal hematoma), but	Discusses patient positioning. Discusses sterile technique and universal precautions. Discusses prepping the patient. Sets up the field efficiently. Uses both U/S (if available) and landmarks to accurately place the CVL. Discusses some of the three common procedure related complications (arterial puncture, air embolism, and retroperitoneal hematoma), maneuvers to minimize their occurrence and how	Discusses patient positioning. Discusses sterile technique and universal precautions. Discusses prepping the patient. Sets up the field efficiently. Uses both U/S (if available) and landmarks to accurately place the CVL. Discusses the three common procedure related complications (arterial puncture, air embolism, and retroperitoneal hematoma), maneuvers to minimize their occurrence and how to treatment these

		does not or incompletely discusses maneuvers to minimize their occurrence and how to treatment these complications.	to treatment these complications. Does not or incompletely discusses the advantages and disadvantages of the femoral vein approach. Incompletely or does not discuss which approach is associated with the least and most infections complications. Does not or incompletely discusses how to localize the femoral vein by the anterior iliac spine and pubis when the pulse is not palpable.	complications. Discusses advantages and disadvantages of the femoral vein approach. Discusses which approach is associated with the least and most infections complications. Reviews the long-term complications associated with central venous access and how to minimize these occurrences. Discusses how to localize the femoral vein by anatomical landmarks of the anterior iliac spine and pubis when the pulse is not palpable.
Ultrasound Access Choose Any one of the above				
Procedure Time				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Does procedure in >10 minutes	Does procedure in 8-10 minutes	Does procedure in 6-8 minutes	Does procedure in 4-5 minutes	Does procedure in <4 minutes
Orientation				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Unable to identify orientation, right or left, or planes	Able to identify one of three orientations (sagittal, transverse or coronal plane)	Can identify at least 2 orientations (sagittal, transverse or coronal plane)	Can identify three orientations	Can teach orientation to basic and advanced students

Ultrasound Principles				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Unable to understand principles of ultrasound	Understands basic ultrasound principles of Doppler	Understands basic ultrasound principles of Doppler and wave transmission	Understands basic ultrasound principles and can explain them satisfactorily	Can teach principles of ultrasound to students at basic and advanced levels
Controls				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Unable to use controls	Able to turn machine on and off, can't use depth	Can use depth of field, may be able to use color or time gain	Can use depth of field, color, time gain correction	Can teach knobology
Use of Probes				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Unable to identify different probes and their use	Can use at least one probe correctly	Can use linear and sector probes	Can use linear, sector and vascular probes	Can teach use of probes, understands limits in orientation
Limitations of Ultrasound				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Doesn't understand limitations of procedure	Understands 1 or 2 of the limitations of procedure	Understands 3 - 4 limitations of procedure	Understands 5 or more limitations of procedure	Understands limitations and can teach others

Note: VOP requires a minimum score of 3 in ALL areas.

CVL
Resident:
Evaluator:
Date:

Appropriately preps and drapes patient				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Critical Fail (endangers patient)	Low fail (omits some important steps)	Pass (safe and within Standards of Care)	High Pass (exhibits careful and consistent attention to detail)	Expert (Could teach others)
Uses ultrasound or appropriate land marks				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Critical Fail (endangers patient)	Low fail (omits some important steps)	Pass (safe and within Standards of Care)	High Pass (exhibits careful and consistent attention to detail)	Expert (Could teach others)
Has full control of the Needle and syringe				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Critical Fail (endangers patient)	Low fail (omits some important steps)	Pass (safe and within Standards of Care)	High Pass (exhibits careful and consistent attention to detail)	Expert (Could teach others)
Places the wire appropriately & dilates the tract				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Critical Fail (endangers patient)	Low fail (omits some important steps)	Pass (safe and within Standards of Care)	High Pass (exhibits careful and consistent attention to detail)	Expert (Could teach others)
Places the line properly and completes flush and dressing				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐
Critical Fail (endangers patient)	Low fail (omits some important steps)	Pass (safe and within Standards of Care)	High Pass (exhibits careful and consistent attention to detail)	Expert (Could teach others)

Note: VOP requires a minimum score of 3 in ALL areas.

GMEC Reviewed and Approved: 5/21/2020