

Simulation Based Mastery Learning Central Venous Catheter Placement

Objectives:

- Demonstrate proficiency in US guided IJ CVC and US assisted SC CVC
- Avoiding mechanical complications
- Correctly complete 90% of the checklist

Protocol:

- Review online curriculum (https://youtu.be/atDmV-ocb_A)
- Deliberate practice with CVC faculty instructor for 2-3 hours (recorded in LS)
 - Instructor must complete a CVC checklist for IJ and SC
 - No critical fail or does not miss >3 checklist items, the instructor may recommend the learner for testing
 - Instructor determines the learner is not ready to test OR if the learner states more practice is needed, the learner will schedule additional practice
 - The testing session will be scheduled at least two weeks after the practice session
- Testing
 - IJ and SC placement with CVC Rater
 - Rater observes an US guided IJ CVC placement followed by a landmark based, US assisted SC CVC placement
 - If the learner does not have a critical fail and does not miss >3 checklist items they will be scored as successful
 - iCELS notifies the learner's coordinator
 - Critical fail or misses >3 checklist items: scored as unsuccessful and will require additional practice with course faculty and testing with a rater
 - Critical Fails: Arterial Puncture, lack of wire confirmation with US (IJ) lack of finder needle placement with qualitative manometer tubing AND wire US confirmation, >2 attempts at either site, loss of guidewire control
- Scenario
 - *You are at the bedside of Joe Harris, a 70-year-old male who presented with SOB. He has a history of hypertension and diabetes. He has been diagnosed with a right sided pneumonia and requires fluid resuscitation and medication administration. His vital signs are: BP 90/40, HR 110 and Temp 102.3. The nurses are unable to access a peripheral vein and he requires a central venous catheter. In this simulated case you will consent the patient and place an IJ CVC followed by a SC CVC.*

Learner: _____ Program: _____ Date: ____/____/____

(Circle): Internal Jugular: Successful Unsuccessful Needs Review

Subclavian: Successful Unsuccessful Needs Review

Central Line Placement (IJ)

Skill Key: A = Done Correctly B = Done Incorrectly C=Not Done

				COMMENTS
1. Informed consent obtained and patient identification checked Benefits: ☐ medicines, ☐ fluids Risks: ☐ infection, ☐ bleeding, ☐ PTX, ☐ HTX, ☐ loss of wire, ☐ arterial puncture, ☐ arrhythmia, ☐ air embolus, ☐ thrombosis, ☐ malposition of line, ☐ death)	A	B	C	
2. Medication allergies specifically to: ☐ rifampin ☐ minocycline ☐ latex ☐ adhesive	A	B	C	
3. Anticoagulation therapy status assessed	A	B	C	
4. Place the patient in slight Trendelenburg position	A	B	C	
5. The US machine is properly set up	A	B	C	
6. Mark the site if appropriate (must be done before any needles enter skin / can verbalize)	A	B	C	
7. Call “time out” (Patient identity, procedure, correct site)	A	B	C	
8. Wash hands or use alcohol rub	A	B	C	
9. Open CVC kit, don mask and hair cover (Ensure others in room have PPE)	A	B	C	
10. Area is cleaned with chlorhexidine (30 seconds, scrub back forth and allowed to dry) If scrubbing back and forth can ask “how long do you need to scrub?”	A	B	C	
11. Don sterile gown and gloves	A	B	C	
12. Area is draped in usual sterile fashion (must be full body drape)	A	B	C	
13. US probe is draped and sonographic gel is used on inside and outside of sheath (more important inside)	A	B	C	
14. Prepare CVC equipment for insertion (Test each port & flush lines with sterile saline)	A	B	C	
15. Clamp each port (keep distal port open) or use caps (caps must be flushed)	A	B	C	
16. Keep distal port open to accommodate guidewire	A	B	C	
17. Keeps all sharps in one visible site or capped.	A	B	C	
18. Draw up lidocaine with filter needle	A	B	C	
19. The vein is localized using anatomical landmarks and the <u>ultrasound machine</u>	A	B	C	
20. The skin is anesthetized with 1% lidocaine without epinephrine in a small wheal	A	B	C	
21. The deeper structures are anesthetized under direct ultrasonic visualization (do not infiltrate past posterior fascia)	A	B	C	
22. Using the short finder needle (or catheter) syringe complex cannulate the vein while aspirating with proper US technique	A	B	C	

23. Detach the syringe from the finder needle	A	B	C	
24. Advance the guidewire into the vein no more than 15-16cm.	A	B	C	
25. Confirm wire location with ultrasound - Never let go of the guidewire while other hand holds ultrasound	A	B	C	
26. Knick the skin with the scalpel (Ensure finder needle is removed before proceeding)	A	B	C	
27. Advance the dilator over the guidewire, verbalize dilating the tissue tract no more than 5-6cm and remove dilator	A	B	C	
28. Advance the catheter over the guidewire, controlling the guidewire steady while moving forward with the catheter	A	B	C	
29. Advance the catheter to the hub	A	B	C	
30. Never let go of the guidewire	A	B	C	
31. Once the catheter is in place remove the guidewire in its entirety and confirm with assistant	A	B	C	
32. Ensure there is blood flow/flush each port (must aspirate before flushing) Place caps here if not done earlier and flush through	A	B	C	
33. Secure the catheter in place (suturing should be verbalized only)	A	B	C	
34. Place hospital approved antiseptic sterile dressing	A	B	C	
35. Get a chest x-ray to confirm location State, "the cxr shows no ptx and you are at the RA SVC junction [if proper depth of insertion]"	A	B	C	
36. Notify nurse that line is ok to use	A	B	C	
37. Maintained sterile technique	A	B	C	
38.				

Additional Notes

Central Line Placement (Subclavian)

Skill Key: A = Done Correctly B = Done Incorrectly C=Not Done

1. Informed consent obtained and patient identification checked Benefits: ☐ medicines, ☐ fluids Risks: ☐ infection, ☐ bleeding, ☐ PTX, ☐ HTX, ☐ loss of wire, ☐ arterial puncture, ☐ arrhythmia, ☐ air embolus, ☐ thrombosis, ☐ malposition of line, ☐ death)	A	B	C	COMMENTS
2. Medication allergies specifically to: ☐ rifampin ☐ minocycline ☐ latex ☐ adhesive	A	B	C	
3. Anticoagulation therapy status assessed	A	B	C	
4. Place the patient in slight Trendelenburg position	A	B	C	
5. The US machine is properly set up	A	B	C	
6. Mark the site if appropriate (must be done before any needles enter skin)	A	B	C	
7. Call “time out” (Patient identity, procedure, correct site)	A	B	C	
8. Wash hands or use alcohol rub	A	B	C	
9. Open CVC kit, don mask and hair cover (Ensure others in room have PPE)	A	B	C	
10. Area is cleaned with chlorhexidine (30 seconds, scrub back forth and allowed to dry) If scrubbing back and forth can ask “how long do you need to scrub?”	A	B	C	
11. Don sterile gown and gloves	A	B	C	
12. Area is draped in usual sterile fashion (must be full body drape)	A	B	C	
13. US probe is draped and sonographic gel is used on inside and outside of sheath (more important inside)	A	B	C	
14. Prepare CVC equipment for insertion (Test each port & flush lines with sterile saline)	A	B	C	
15. Clamp each port (ok to keep distal port open) or use caps (caps must be flushed)	A	B	C	
16. Keep distal port open to accommodate guidewire	A	B	C	
17. Keeps all sharps in one visible site or capped.	A	B	C	
18. Draw up lidocaine with filter needle	A	B	C	
Can begin SCL Test here if previous steps were performed adequately during IJ test in the same session				
19. The vein is localized using anatomical landmarks with ultrasound assisted technique. Ask: how did you determine the site of needle entry? Correct Reply: I am going 1 cm under the clavicle at 1/3:2/3 of the way	A	B	C	
20. The skin is anesthetized with 1% lidocaine without epinephrine in a small wheal	A	B	C	
21. The deeper structures are anesthetized using the longer needle (must numb the periosteum of the clavicle) +/- under direct ultrasonic visualization	A	B	C	

22. Using the long finder needle (or catheter) syringe complex cannulate the vein while aspirating. Ask: what direction is your needle pointed? Reply: Towards suprasternal notch.	A	B	C	
23. Detach the syringe from the finder needle and connect the qualitative manometer tubing, once venous placement confirmed, detach tubing	A	B	C	
24. Advance the guidewire into the vein no more than 15-16cm.	A	B	C	
25. Confirm wire location in supraclavicular section of vein with ultrasound - Never let go of the guidewire while other hand holds ultrasound	A	B	C	
26. Knick the skin with the scalpel (Ensure finder needle is removed before proceeding)	A	B	C	
27. Advance the dilator over the guidewire, verbalize dilating the tissue tract no more than 5-6cm and remove dilator	A	B	C	
28. Advance the catheter over the guidewire, controlling the guidewire steady while moving forward with the catheter	A	B	C	
29. Advance the catheter to the hub	A	B	C	
30. Never let go of the guidewire				
31. Once the catheter is in place remove the guidewire in its entirety and confirm with assistant	A	B	C	
32. Ensure there is blood flow/flush each port (must aspirate before flushing) place caps here if not done earlier and flush through	A	B	C	
33. Secure the catheter in place (suturing should be verbalized only)	A	B	C	
34. Place hospital approved antiseptic sterile dressing	A	B	C	
35. Get a chest x-ray to confirm location State, "the cxr shows no ptx and you are at the RA SVC junction [if proper depth of insertion]"	A	B	C	
36. Notify nurse that line is ok to use	A	B	C	
37. Maintained sterile technique	A	B	C	

Additional Notes

Grading Guidelines

Checklist items clarified with rationale if learner asks:

Not done correctly = missed Please mark wrong each step not performed correctly, this will assist you to go back and teach the specific area of concern after the first assessment.

Critical Fails:

Arterial Puncture (Red fluid or mixed fluid, may be mixed because learner went through vein to artery creating fistula)

More than 2 needle passes through the skin (the task trainer is the ideal subject for training and should be cannulated with less than 2 attempts)

Does not confirm the wire is in the vein by US (IJ) or by US and qualitative manometer tubing (SC)

Loss of guidewire control (even if subtle)

Attention: It is important to continue the exercise after formative instruction is given in order to compare and/or teach the other areas of the psychomotor skill. For example: if the learner requires more than two attempts to pass the needle or if the learner does not confirm wire placement.

Arterial puncture requires stopping procedure and verbalizing hemostasis techniques