

Critical Care Medicine Section

# Why Play the Waiting Game?

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Let's say you have a patient in the emergency department (ED), who has been coughing and feeling ill.

You note that his triage vital signs are consistent with sepsis, the initial lactate is 4.3 and so you start giving fluids per CMS Sepsis guidelines. Despite giving the required fluids, the blood pressure continues to decline and so you decide you want to give vasoactive medications. At the same time, the nurse

informs you that the IV has infiltrated and despite multiple attempts, another peripheral IV cannot be established. What are your next options?

## At the bedside of a critically ill patient, time is of the essence.

There are a few options here. The most popular would be to either use an ultrasound to get a peripheral intravenous line (PIV) and give vasoactive medications peripherally or decide to put in the central venous catheter (CVC).<sup>1,2,3</sup>

Safety of peripheral vasoactive medication administration has shown to be useful in the appropriate setting, evidence to state the contrary is sparse and opinion based. Based on consensus, vasoactive medication can be administered through PIV access when a 20 gauge or larger PIV is placed in the antecubital fossa or proximal. These are policies, rather guidelines that many institutions have adopted.

Nevertheless, if the patient has poor access and needs multiple medications simultaneously or attempts at ultrasound guided PIV come with no avail, then perhaps the CVC is the optimal choice. Once the decision to place a CVC is made, focus should be on procedure completion and confirmation to minimize time to medication, time to MAP improvement and decrease mortality from persistent hypotension.<sup>4-8</sup>

Current practice is to place the CVC, with ultrasound guidance, await radiographic confirmation before starting mortality changing medications.<sup>9-12</sup> Chest radiography confirms catheter location and rules out pneumothorax. In multiple studies, radiographic confirmation can take anywhere from 20 minutes up to one hour, if not longer.

## With the advent of point-of-care ultrasound, why wait?

When a CVC is placed with ultrasound guidance, wire confirmation in the vein during placement, and without complication, the use of the "Bubble Test" and anterior chest sonography should be employed for immediate confirmation and use.

Ultrasound has been shown to be more sensitive than supine chest radiography for pneumothorax.<sup>13-17</sup> With the patient still in position for the CVC, the linear probe should be placed over the anterior surface of the chest wall to evaluate for pleural sliding. For additional confirmation, using M-mode over the pleura can be used to look for "sand on the beach" vs "bar-code" sign for normal vs lack of sliding, respectively.

CVC tip should be in or near the distal superior vena cava. This can be easily confirmed using the "Bubble Test". This can be accomplished with the patient still in position, the subxyphoid view of the heart is obtained using the phased array probe. Either 10cc normal saline flush or agitated saline should be quickly administered via the distal port of the CVC. A "snow storm" of turbulent flow should be seen in the right ventricle in under two seconds from time of administration. This confirmed adequate placement.<sup>18-22</sup> Additionally, location of CVC tip may not be as significant for non-caustic infusions (chemotherapeutics, etc.) as previously thought. So long as the CVC tip is near or in the right atrium, superior vena cava, brachiocephalic veins or subclavian vein, short term infusion of medications and fluids is considered safe.<sup>23</sup>



While many institutions require chest radiography for confirmation and documentation of CVC placement, utilizing immediate ultrasound can rule out major complications, such as pneumothorax and malposition, allowing for timely medication and fluid administration.

## The radiography can still happen, but at least we are not waiting for it.

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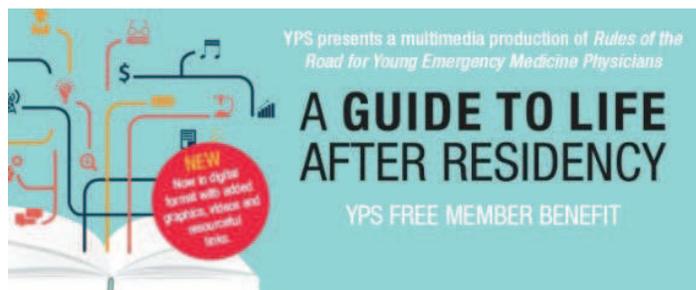
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