



## Safe and ultrasound

Why the ultrasound-guided approach to central vein catheterization is replacing the landmark method.

Since 1900, life expectancy has increased from less than 50 years to more than 80, thanks in part to remarkable improvements in medicine and healthcare delivery. Nonetheless, as renowned surgeon Atul Gawande once wrote, “We look for science to be an orderly field of knowledge and procedure, but it is not. It is an imperfect science, an enterprise of constantly changing knowledge, fallible individuals and, at the same time, lives on the line.”

Unfortunately, one time that patients are most vulnerable to the fallibility of medicine is when they are hospitalized. In fact, each year, 5 percent of all hospitalized patients develop healthcare-associated infections (HAIs), and almost 100,000 die as a result. The most deadly of all HAIs are central line-associated bloodstream infections, also known as CLABSIs. The associated mortality rate hovers

between 30,000 and 62,000 deaths per year, with an average treatment cost of \$26,000 per case.

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### A double-edged sword

Central vein catheterization (CVC) into a large vein in the neck, chest or groin allows large-scale therapeutic interventions for patients, who require intensive nutritional, chemotherapeutic, antibiotic or transfusion-related support. CVC is intended to save lives, but there’s a trade-off. Central lines are deeply embedded and usually placed for several

weeks to months, making patients vulnerable to a host of infections.

Now the good news: The incidence of CLABSIs has been decreasing in the ICU setting. For a while, there was a great deal of focus on treating the infections, particularly multidrug-resistant organisms, such as methicillin-resistant *Staphylococcus aureus* (MRSA), which is most likely to kill patients with CLABSIs. However, in 2001, the focus shifted to prevention, when the Agency for Healthcare Research and Quality published a paper suggesting that “real-time ultrasound guidance increases the success rate and decreases the complication rate associated with CVC placement.” Subsequently, in 2005, the Institute for Healthcare Improvement (IHI) introduced the “bundle” approach for decreasing blood stream infections through five main approaches including: hand hygiene, maximal barrier precautions, chlorhexidine skin antisepsis, optimal catheter site selection and an ongoing daily review of whether or not the line is necessary.

## A two-pronged approach

Over time, it has become clear that this “bundle” procedure, combined with ultrasound-guided CVC placement, is the optimal approach to reducing the risk of CLABSI. This realization — grounded in evidence — has led top academic medical centers, such as Cedars-Sinai Medical Center in NYC, Brigham & Women’s in Boston, Memorial Hermann in Houston and others, to implement ultrasound-guided CVC placement as a best practice, though many community-based hospitals still lag behind.

A 2010 systematic review of evidence culled from over 3,000 peer-reviewed articles found that compared with using the traditional landmark method, point-of-care ultrasound significantly decreased central line-associated complications. Using ultrasound also significantly reduces the

time needed to complete the catheter insertion procedure, as well as the number of needle attempts. Using ultrasound has also been positive for patients undergoing anesthesia. Ultrasound-guided blocks have a 29 percent shorter onset time, last 25 percent longer and have a decreased risk of vascular puncture.

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## Broad adoption of ultrasound guidelines

Because of the strength of evidence supporting the use of ultrasound-guided CVC placement, multiple medical societies have developed related guidelines, including the American Board of Internal Medicine, the American Society of Anesthesiologists, the American College of Chest Physicians, the National Institute of Health and Clinical Excellence, the European Society for Clinical Nutrition and Metabolism and many others.

Ultimately, it is the sickest, most vulnerable patients who require CVC. They are also the patients who stand to benefit the most from a best-practices approach to central line management based on ultrasound-guided CVC. Add to that substantial cost-savings and an improved CVC success rate, and it is good all around — even, as Dr. Gawande might say, if it’s not perfect.

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