

Ultrasound increases accuracy of central line placement in children, study finds

13 March 2013, by Erin Digitale

(Medical Xpress)—By adopting a technique that's already widely used in adult medicine, pediatric surgeons could save many children from complications associated with a common but risky hospital procedure. That's the conclusion of a new study from the Stanford University School of Medicine and Lucile Packard Children's Hospital.

The procedure is the insertion of a central venous catheter, a type of intravenous line that gives direct access to the largest vein in the body. Insertion requires aiming a needle deep into the body to puncture the vein and create a pathway for the catheter to be threaded inside. If placed improperly, the needle can cause complications. Until now, pediatric surgeons have usually relied solely on their knowledge of anatomy to aim the needle in the right place, in spite of strong evidence from adult medicine showing that watching the needle's progress with [ultrasound imaging](#) is a faster and safer method than using only anatomical landmarks to guide insertion.

"Although it's a common procedure and is sometimes perceived as benign, it's not," said Sanjeev Dutta, MD, senior author of the new study. "We found that, even in the hands of experienced pediatric surgeons, the use of ultrasound can mitigate the risk of complications when placing central lines." Dutta is a [pediatric surgeon](#) at Packard Children's and an associate professor of surgery at the School of Medicine. The research was published online today in the *Journal of the American College of Surgeons*.

In the study, when pediatric surgeons used ultrasound, they were able to successfully guide the needle safely into a vein 65 percent of the time on the first try, and 95 percent of the time within three tries. In contrast, when they used only anatomic landmarks to guide insertion, success rates were 45 percent on the first attempt and 74 percent after three attempts. Previous research has shown that needle placement into a vein for

central line insertion is associated with few complications if it succeeds on the first try, but after three attempts, the risk of complications jumps sharply. Complications of a failed insertion can include bleeding in the chest cavity, lung puncture that causes air to be trapped in the chest cavity, puncture of the carotid artery and, rarely, fatal complications such as strokes.

The results echo previous studies in adult patients; in fact, in a statement issued in 2010, the American College of Surgeons formally recommended ultrasound-guided central line placement for both adults and children.

The study used a randomized prospective design, the most rigorous type of clinical trial. It included 150 pediatric patients, ages 0 to 18, who received surgical care at Packard Children's or at Children's Mercy Hospital in Kansas City, Mo. The surgeons who participated had varying levels of experience, from a few years to decades of surgical practice.

Central venous lines are used when a peripheral IV, the type often inserted into a hand or arm, would not be sufficient. For instance, patients receiving large volumes of fluid or medications, and those whose medical conditions require venous access for long periods of time, are given central lines. Also, certain medications, such as some forms of chemotherapy, corrode small veins, so they must be administered in a larger vein.

Dutta hopes the results will encourage others in his field, surgeons who are often conservative about adopting new practices, to use ultrasound when they need to give children central lines. "Why are we as a specialty persisting in doing it this way, when most others have changed their practice?" he said. "It's such an easy thing to use. With ultrasound, we can see the vein and guide the needle with direct visualization." Ultrasound-guided central line placement has been widely adopted by pediatric surgeons at Packard Children's, he noted.

Provided by Stanford University Medical Center

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