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World leader and specialist in hand-carried ultrasound.

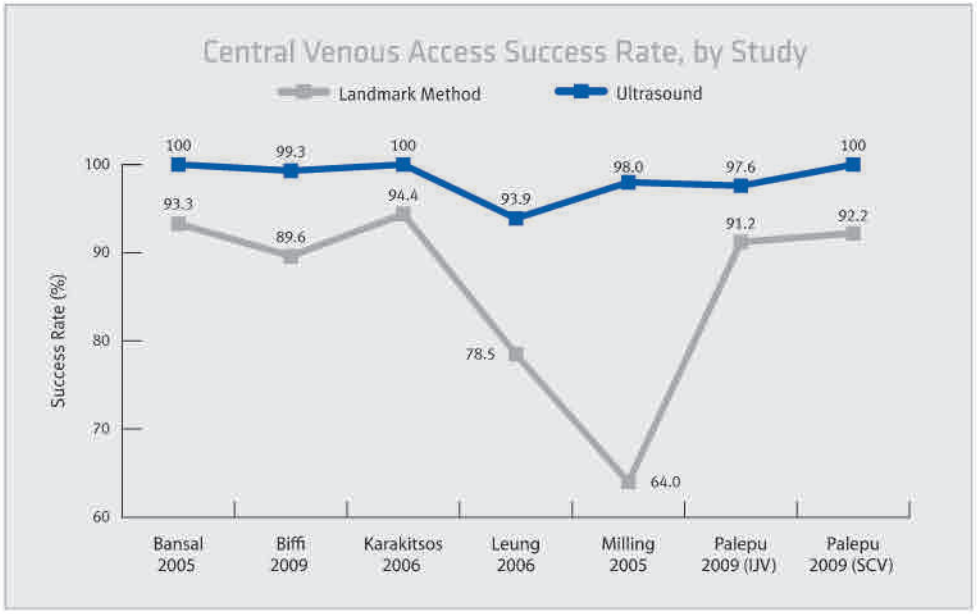
The Safety Impact of Point-of-Care Ultrasound

A Review of the Evidence

To assess the benefits of hand-carried ultrasound, United BioSource Corporation (UBC)—experts in the development of real-world evidence of product effectiveness, safety, and value—conducted a systematic review of English-language medical literature. UBC performed a comprehensive search of electronic databases (MEDLINE, Embase, and Current Contents®) for studies of ultrasound guidance of percutaneous procedures published between 1990 and 2009. Nearly 3,000 citations were identified, and ultimately 33 publications met design eligibility and relevance requirements for this review. Randomized and nonrandomized trials were examined for procedural success rates and for complications. Below are the highlights of this review.

Increased Safety in Central Venous Catheter (CVC) Access

- A decrease in CVC-related bloodstream infections among patients receiving ultrasound guidance could be the result of fewer needle passes, lower venous thrombosis, and reduced hematoma formation *(Karakitsos et al 2006)*.
  The Karakitsos study demonstrated:
  - A higher success rate with use of ultrasound-guided central venous catheter insertion vs. landmark method (100% vs. 94%)
  - A reduction in carotid punctures (1% vs. 10.6%)
  - Fewer hematomas (0.4% vs. 8.4%)
  - A decline in hemothorax (0% vs. 1.7%)
  - A reduction in pneumothorax (0% vs. 2.4%)
- Use of ultrasound resulted in a significant difference in time to procedure, procedure completion, and number of needle attempts *(Miller et al 2002)*.
- Ultrasound-guided placement was found to be superior to the landmark technique *(Milling et al 2005)*.



Investigators of 5 studies assessed [ultrasound]-guided procedures relative to landmark methods in the placement of catheters into internal jugular vein... and found significantly higher success rates and reduced complication rates in all studies.

Clinical and Economic Value of Point-of-Care Ultrasound: A Systematic Review of the Literature

United BioSource Corp., 2010.*

Hand-carried ultrasound systems improve patient safety and the efficiency of patient care.

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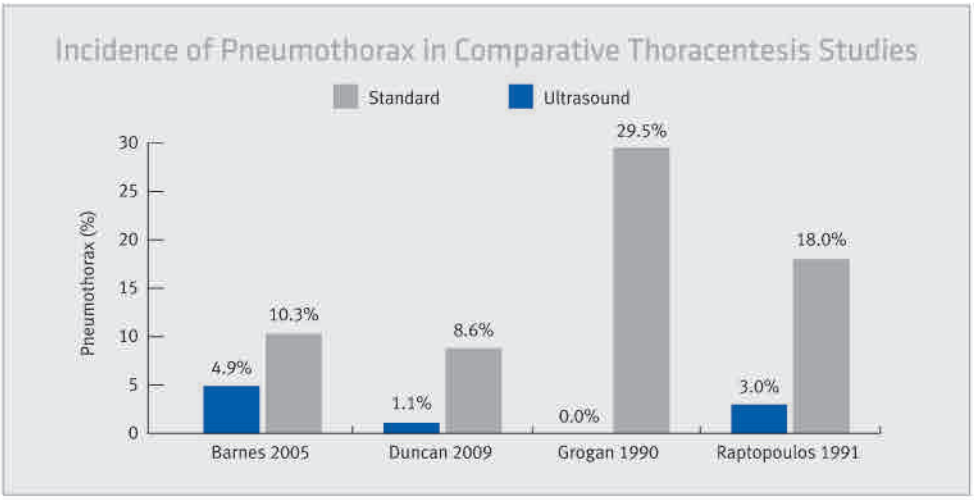
Reduced Complications in Thoracentesis and Increased Success in Paracentesis

For all studies reviewed, the overall incidence of pneumothorax with ultrasound-guided thoracentesis was 0%-4.9% vs. 8.8%-29.5% in the nonultrasound group. Multiple studies showed that the use of ultrasound guidance for thoracentesis reduced the incidence of pneumothorax to:

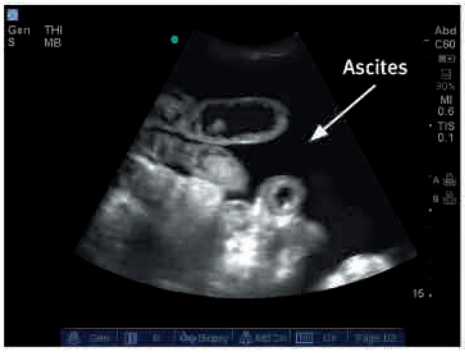
- 3% with ultrasound vs. 18% with conventional techniques *(Raptopoulos et al 1991)*
- 4.9% with ultrasound vs. 10.3% without *(Barnes 2005)*
- 1.1% with ultrasound vs. 8.6% without *(Duncan et al 2009)*
- 0% compared to 39% for needle-catheter and 20% for needle-only *(Grogan et al 1990)*

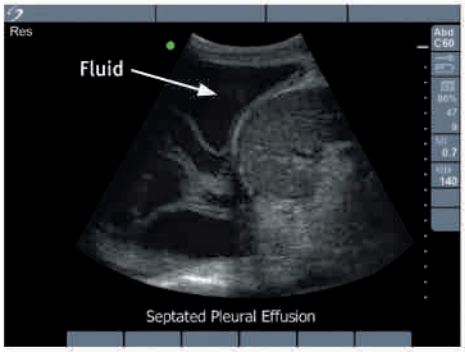
The use of ultrasound guidance for thoracentesis reduced the rate of chest tube requirement *(Barnes 2005)*.

The report notes that the Grogan study "found that US-guided thoracentesis was associated with significantly fewer serious complications... compared to needle-catheter... The US-guided technique was also associated with fewer pneumothoraces and concluded that the US-guided method is the safest."



The Nazeer study reported that patients with ascites who underwent ultrasound-guided aspirations had a 95% success rate compared with a 61% success rate in traditionally treated patients.





Improved Efficiency of Patient Care for Peripheral Nerve Block Anesthesia

Abrahams et al (2009) conducted a meta-analysis of 13 randomized studies comparing ultrasound guidance during nerve block for regional anesthesia with electrical neurostimulation. They found that ultrasound-guided nerve blocks:

- Were more likely to be successful (risk ratio for block failure 0.41, 95% CI 0.26-0.66, p<0.001)
- Had a 29% shorter onset time
- Lasted 25% longer
- Decreased the risk of vascular puncture during block performance (risk ratio 0.16, 95% CI 0.05-0.47, p=0.001)

Please visit **www.sonosite.com/evidence/clinical-evidence** to view a complete list of sources.

*Contact your SonoSite representative to request the full report, *Clinical and Economic Value of Point-of-Care Ultrasound: A Systematic Review of the Literature.*