



Portable Ultrasound Market Grows as Machines Become Smaller, Better

By Deborah Abrams Kaplan | April 14, 2011

The reach of portable or compact ultrasound is increasing, with the machines getting smaller, better and more adaptable. In fact, this segment of the market is outpacing the overall ultrasound market, according to a report published by Klein Biomedical Consultants in February.

U.S. [compact ultrasound](#) sales were \$276 million in 2010, a 21 percent increase from the previous year, with continued growth expected, according to the report, "The U.S. Market for Compact Ultrasound Systems: Challenges & Opportunities – 2010." "The compact ultrasound market continues to be the largest segment of the overall ultrasound market in the U.S.," industry analyst Harvey Klein, PhD, said in a statement.

When talking about compact ultrasound, one problem is defining which products fit into which categories. Terms like portable, point-of-care, compact, laptop, hand-held, pocket-carried, hybrid, and cart-based are defined differently depending on whom you ask. And some machines fit into several categories.

While many call it portable ultrasound, even that concept can be misleading, since portable connotes the idea of a small cart-based or hand-held device. Deborah Levine, MD, professor of radiology at Harvard Medical School, said that her department sometimes wheels their large ultrasound machine, with all its bells and whistles, to the neonatal or surgical intensive care unit on different floor for a study. The unit has a motor to assist with transport. "We thought of getting smaller machines," she said, but it's sometimes hard to get the full range of exams using a laptop machine with intensive care patients. "You need to be able to do the full range of exams in a portable setting."

The Klein report defines compact ultrasound systems as those weighing 14 pounds or less, including handheld, hand-carried, and laptop machines.

Instead of using a weight determination, Christopher L. Moore, MD, assistant professor in the Department of Emergency Medicine at Yale University School of Medicine, breaks down compact machines into three groups: compact cart-based, laptop size, and pocket-carried. He noted that many hand-carried systems are actually used mostly on compact carts.

Ultrasound's [use in different specialties](#) is varied. As Moore and Joshua A. Copel, MD point out in their New England Journal of Medicine review article, "Point-of-Care Ultrasonography" (2011, 364:749-57),

ultrasound is used across the board to guide or monitor vascular access for procedures. Aside from more commonly known obstetrics and cardiology functions, other specialties also find ultrasound invaluable. In anesthesia, it's used to monitor fluid status, while in ophthalmology, physicians use ultrasound to assess the cornea and retina. Urology practitioners find it helpful in renal, bladder, and prostate assessment, while dermatologists can assess skin lesions and tumors with the technology.

The five largest U.S. specialties buying compact ultrasound machines, which represent 66 percent of the market, are radiology/vascular medicine, emergency medicine, cardiology, anesthesiology, and musculoskeletal, according to the Klein report.

As the machines shrink in size, their popularity is poised to grow even more. The Klein report noted that the handheld market alone will reach \$78 million in sales by 2015.

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Moore has been impressed with GE Healthcare's Vscan, noting that his emergency department has one. "The Vscan by GE is probably the most popular pocket-held one out there now," he said. "I've been very impressed with the image quality, given the size. It won't replace the cart-based machines, especially for more comprehensive tests, but it's extremely portable and light and you can carry it around with you for a shift."

Physicians are figuring out the best way to use these hand-held machines, given their limitations. Moore said that while the Vscan can record images, it does not include patient information on the scan like , whereas other machines that show the medical record number and patient ID number. He said the current generation of the Vscan doesn't have wireless transmission and isn't set up to archive images, "which is arguably important for a focused diagnostic test, and is required for billing. So the question is whether something like that would be used like a stethoscope, rather than for true diagnostic focused imaging,." Moore said.

The data can be downloaded manually, but the lack of wireless transmission makes it less efficient. Moore said that in order to bill for a Vscan study, he needs to place an order in the hospital system, download and archive the completed scan, and generate a written report.

"For the exams that we are expecting reimbursement for, like the FAST exam [focused assessment with sonography for trauma], we're doing that," he said. However, it's conceivable that for a handheld like the Vscan, he said, doctors will just document the study interpretation as part of the physical exam, with no image archival or billing for the procedure.

The newer compact machines, larger than the handhelds do have wireless capability to transfer the images into the PACS system, and that's how Moore's ED uses them.

One other change to point-of-care ultrasound is that many programs are using dynamic images, cineloops, which are three to five second clips instead of a still image. The ability of PACS systems to handle cineloops is improving, given the decreasing cost of storage. "Ultrasound is very difficult to interpret from a still image," Moore said, adding that while sonographers do their interpretation by looking at moving images, they often only save still images for the radiologist to look at. He said that while this is fine for keeping a representative image, in many cases it is difficult to make an interpretation from still images, so the radiologist has to rely on the sonographer's interpretation.

Different Needs, Different Uses

Physicians or practices using ultrasound should choose a system that fits with their patient population and need. A busy radiology practice that does a lot of ultrasound and wants to be able to use it for everything usually has a top-of-the-line machine with a lot of different probes. Levine said.

However an ICU that might need the machine only to look for fluid around the lungs, or to assist in inserting a catheter into a vessel, can justify getting a laptop-sized ultrasound machine, as long as the machine can provide quality images.

“You need to know your patient population to know what type of machine you need for the specific types of examinations you perform,” she said.

For practices in the market for a new machine, Levine recommends not only asking colleagues for their opinions, but asking the sales representative to loan a machine for a several-day trial. “You need the machine in your own environment with your own patient population and the types of scans you usually do,” she said. “Make sure you have the full range of studies that you want that machine to do. The machines have different packages, with presets for contrast, resolution, and power, and many other types of settings for different exam types, different transducers, and different patient body types. You need to make sure that for these different types of studies, that the probes and the machines are adequate to do what you want them to do.”

Size Matters

Screen size and resolution also matter in a machine, and are two different but overlapping issues. Levine said that if you’re looking at an X-ray or mammogram, you need a really high resolution screen, because you’re looking for things that are really small. With ultrasound you need a screen that is 256 x 256 or 512 x 512. If you’re using a tiny screen you may have trouble seeing things, and you could lose resolution while zooming in. Although Levine said she hasn’t spent much time with the handheld machines, she is comfortable with the image quality on the laptop-size ones.

Moore reports that the image quality for the handheld Vscan is good for its size, as long as you’re the only one who needs to look at it. “With pocket-carried ultrasound, it’s good for one person, but harder if you’re trying to teach with it,” said Moore. “It’s not at the level of the cart-based system, though with straightforward examinations in patients with good windows, such as thin patients, it is often fine.”

And though the small size and portability of some ultrasound machines is helpful in areas with limited space, smaller is not always better. “There’s a misconception in industry that in the emergency setting, smaller is always better,” said Moore. Although size is important, there are some very good compact-based cart systems. And, in most cases, even a hand-carried system is put on a cart. “If you carry it into the room, you have nowhere to put it. It’s generally better to have a cart in the emergency setting and in critical care” he said.

Some of the compact machines like the one developed by Zonare Medical Systems Inc. are approaching the image quality of the larger machines, he said. While the Zonare is a hybrid machine that can unplug from the cart to be carried elsewhere, Moore said that in most cases, people primarily use it while it’s attached to the cart. “I always push it on a cart. The cart has a bigger screen than the hand-carry. It hooks up to a monitor everybody can see,” he said.

As the machines continue to improve in quality and decrease in size and cost, their use, especially in remote areas, will increase. “Ultrasound is going to Mt. Everest. It’s on the space station. More and more it’s going to resource-limited areas in the developing world,” said Moore. “We sent a GE laptop

machine to Nepal through Nyaya Health. We have a process for remote quality assurance of their images for review purposes via an Internet connection.”