As CAD for Breast MRI & Mammography Gain Acceptance—Are Economic Issues the Final Barrier?

CAD proves its worth

Huong Carisa Le-Petross, MD, assistant professor of breast and body imaging in the department of radiology at M.D. Anderson Cancer Center in Houston, has been using Invivo's Breast MRI CAD, in addition to R2 Technology's Mammography CAD system, for several years.

Mammography CAD is particularly beneficial in an all-digital environment, Le-Petross says. She explains that currently, when the technologist performs the exam, the CAD application is already activated, so when the radiologist assesses the image at the reading station, the mammo CAD images are already present.

"The CAD images now simply serve as additional images at the end of the exam—the last image that the radiologist views to double-check his or her assessment. For us, the CAD tools have become part of our daily routine," Le-Petross says.

M.D. Anderson was using a breast MR system in the body imaging department, and upon her arrival at the facility, Le-Petross developed a protocol to utilize the systems for breast-specific imaging. "I've always used CAD, along with breast MR [CAD], because you need some kind of enhancement [rate of contrast agent uptake] of the lesion, as well as the rate that it leaves the lesion," she says.

"Nowadays, CAD for breast MRI is becoming a vital part of breast MRI interpretation. This post-processing software allows more efficient interpretation of breast MRI cases, by providing functional color maps and time-intensity curve almost instantly after an exam is sent to the workstation. The colorized maps allow the radiologist to quickly identify suspicious lesions or lesions that have suspicious enhancing pattern, in a background of multiple enhancing lesions with more benign enhancing pattern. Prior to the era of breast MRI CAD, the same information can be obtained but requires several steps by the radiologists or technologists. Now, those steps are bypassed because the CAD software automatically processes the necessary final images for the radiologists to review and interpret the study. This improves the workflow and throughput of breast MRI interpretation," Le-Petross suggests. "You also can customize the products to your preferences."

Practice makes perfect

While Le-Petross has not witnessed a resistance to CAD's adoption, especially with the newer, more "user-friendly versions," she acknowledges there is a learning curve associated with any technology.

Due to the much-publicized reports of false-positive rates particularly associated with mammography CAD, some radiologists were initially hesitant. However, Le-Petross

suggests those distractions can be quickly overcome, as the user becomes more experienced with the application. “The higher the volume of images that a person reads, the less likely he or she is going to rely solely on CAD,” she notes.

Marcela Böhm-Vélez, MD, radiologist at Weinstein Imaging Associates and clinical assistant professor of radiology at the University of Pittsburgh in Pennsylvania concurs with Le-Petross that once the learning curve is overcome, problems with false-positive rates quickly decline. In fact, she believes that the remaining attitudinal impediments about “CAD, as with any new technology, are mainly rooted in a lack of comfort and understanding of its benefits.”

Böhm-Vélez and her colleagues all specialize in breast imaging. “We use iCAD’s mammography CAD tools to confirm our suspicions, and will study areas that [the system] marks, but don’t depend on it as a decision maker. However, for the majority of radiologists, who read multiple modalities, CAD can give them tremendous confidence by offering them the advantage of a second reader,” she says.

Despite solely reading mammograms in her practice, **Böhm-Vélez** says that CAD helps with large workloads. “It draws your eyes to certain pinpointed areas that maybe you hadn’t looked at,” she explains.

In fact, “CAD in mammography clearly increases the efficiency and confidence level of radiologists while searching for subtle microcalcification clusters and, when asked, most users will subjectively comment that they are less fatigued at the end of a CAD-supported reading session,” according to a perspective written by Andrea B. Wolf and Rachel F. Brem in the February issue of the *American Journal of Roentgenology* (2009; 192:400-402).

Mammography CAD also is “excellent for teaching purposes,” Bö**hm-Vélez** notes, as it will assist less-experienced readers with proper lesion identification.

Le-Petross adds that the “most important aspect of false-positive rates is confirming with tissue diagnosis. In an institution that utilizes breast MRI CAD and mammography CAD, the radiologist who calls for an image, should perform the biopsy, because that is the quickest way to learn. Lower false-positive rates have everything to do with volume and experience.” She also notes that CAD tools often have “user-friendly biopsy software, which can direct where and how deep to insert the needle.”

Economic considerations

“CAD is a necessity because two sets of eyes are always better than one,” **Böhm-Vélez** says. “If you had the luxury of having two radiologists read every study then that would be ideal, but that is simply not cost-effective, allowing CAD to fill that void.” Current mammography reimbursement rates “are extremely low and barely cover the costs of one radiologist.”

In 2002, legislation was passed that resulted in the Centers for Medicare & Medicaid

Services (CMS) increasing the reimbursement for mammography procedures from $69.23 to $81.81. “Although a move in the right direction, this increase still did not cover the cost of mammography. There remains a clear financial disincentive to mammography facilities,” Wolf and Brem wrote in their just-released study.

Despite the proven necessity of mammography screening and the benefits of CAD, Böhm-Vélez is hesitant to believe that CMS will consider any increases in reimbursement rates due to Medicare’s current deficit. “On the contrary, I think U.S. reimbursement rates across the board will decrease because of the economy, which has already started to take its toll on whether women undergo mammograms at all,” she says.

“Our experience has been that if you tell a radiologist that CAD could be eliminated as a diagnostic option, most would adamantly object. However, it is not clear if he or she would take the same position if it were to become non-reimbursable or if he or she had to pay for it themselves,” according to Wolf and Brem. They predict that reimbursement for CAD use (technical and professional combined) in the United States could exceed $800 million per year.

In the meantime, **Böhm-Vélez** suggests that CAD is a cost-effective means of employing “a second pair of eyes without requiring a second radiologist.”

CAD is here to stay

While **Böhm-Vélez** notes that CAD will only continue to experience wider adoption rates —especially as the economy stabilizes—she stresses that larger, multi-center clinical studies are needed to prove that it does increase the sensitivity of breast cancer detection.

However, smaller, single-center studies have already begun to prove its clinical efficacy. For example, Juliette The and colleagues recently used CAD to evaluate 123 cases of breast cancer detected with full-field digital mammography in Florida. CAD detected 93 percent of cancers manifesting as calcifications, 92 percent as masses and 100 percent as mixed masses and calcifications. CAD sensitivity for cancers 1–10 mm was 89 percent; 11–20 mm was 97 percent; 21–30 mm was 100 percent; and larger than 30 mm was 93 percent (AJR 2009; 192:337-340).

Another study, conducted by Ja Kim et al on 93 women with breast cancer in South Korea, found that the sensitivities of the CAD system at initial and follow-up digital mammography were 91 percent and 89 percent, respectively, for detection of masses. Sensitivity of the CAD system for detection of microcalcifications was 100 percent at both initial and follow-up digital mammography (Radiology 2008; 246:71-80).

Despite any lingering concerns, Brem and Wolf conclude that “CAD is here to stay.” **Böhm-Vélez** and Le-Petross concur that CAD has become an irreplaceable tool in their breast imaging facilities, and with increasing experience, it easily integrates into the user’s daily practice.

CAD can help alleviate overblown malpractice risk in breast imaging

Based on a study conducted in 1990 and repeated in 1995 and 2002, the Physicians Insurers Association of America found that delay in breast cancer diagnosis had become the most common reason for U.S. medical malpractice lawsuits filed.

Concern about malpractice litigation has been cited by radiologists for their declining interest in specializing in mammography, causing more than one third of practicing radiologists to consider leaving the field of breast imaging.

Yet, radiologists who work in breast imaging tend to overestimate the actual risk of medical malpractice lawsuits (AJR 2009; 192:327-333). The percentage of radiologists reporting malpractice claims related to mammography was 8 percent in 2002 and 10 percent in 2006. The study's lead author Joann G. Elmore, MD, found that radiologists working at facilities that did not use double-reading reported higher perceived risk.

Results showed that "the radiologist's median estimate for the likelihood of being sued was four times higher than their actual risk," according to Elmore et al. In 2002, a radiologist's perceived risk of being sued in the next five years was 41 percent and in 2006 was 35 percent. "Their perception of risk is much higher than the reported reality," she said.

Some legal uncertainties exist regarding the impact of technologies, such as CAD, on malpractice litigation. However, in one recent lawsuit, an appellate court upheld negative CAD results as reliable supportive evidence in the radiologist's defense (AJR 2006; 186:48-51).

"While many radiologists are concerned about the litigious actions resulting from a missed breast cancer, CAD can provide confidence to these cautious individuals," says **Marcela Böhm-Vélez, MD**, clinical assistant professor of radiology at the University of Pittsburgh in Pennsylvania.

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