

UCSF: Breast Imaging Pioneer Creating New Standards in Reading Efficiency and Workflow

By Mary C. Tierney, MS

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University of California San Francisco Medical Center has a long history of setting the standards in breast imaging and breast cancer care. Now it's also setting the standard when it comes to reading and managing digital breast images and facilitating workflow efficiency.

UCSF Medical Center is one of the five University of California Medical Centers, serving as both state institution and academic university. They are ranked one of the nation's top five hospitals by U.S. News & World Report. Each year, services generate more than a million patient visits to their clinics and about 46,000 hospital admissions. Perhaps the best-known UCSF service is the UCSF Helen Diller Family Comprehensive Cancer Center which has won the National Cancer Institute's highest designation—"comprehensive"—for innovative research and cutting-edge patient care.

The breast imaging team there, led by Chief of Breast Imaging Bonnie Joe, MD, PhD serves a broad spectrum in breast care including breast imaging in the community environment, medical center and dedicated cancer center. Care starts with breast screening and spans to comprehensive cancer imaging care, with the team each year caring for some 20,000 to 30,000 patients. Many of the diagnostic cases they manage, most often complex cases, come from tertiary care referrals.



Bonnie Joe, MD, PhD

"We have our own screening recalls, but a majority of our diagnostic practice comes from elsewhere," says Joe, "including patients who are seeking second opinions or they're coming to UCSF for their cancer treatment. It's a very busy diagnostic and biopsy practice, largely due to a lot of referral business."

often breast images are generated within the UCSF health system. But with so many referral cases they also receive many images from other hospitals and practices. Managing all of those images is a strategic priority. The team relies on a dedicated breast imaging PACS that is efficient, flexible, scalable and integrates well with their EMR and enterprise PACS. Radiologists read all images from one workstation rather than moving among many workstations. "The efficiency of having just one workstation to read from

really is amazing,” Joe says.

Gone is the time-drag of radiologists moving from one PACS to review ultrasound exams or MR images to yet another standalone workstation to review mammograms and sometimes multiple workstations with multiple mammo equipment vendors. Also gone is the physician struggle to mentally correlate the results of all the modalities for a comprehensive patient view. “Reading that way, which we did for many years, is far from optimal for patient care or reading efficiency,” she notes. “It is not the best way to review images and patient information. It’s all why we brought on a true breast imaging PACS.”

Here are some of the parameters they defined as must-haves to facilitate the best breast imaging workflow. A comprehensive, vendor-neutral, scalable, breast imaging solution that supports high-volume screening and advanced diagnostic workflows. Radiologists have a full patient overview to read all types of radiology images from a single workstation and instant access to the tools they need for both reviewing studies and reporting. Reporting was a priority too, via a native reporting tool called Breasttrak that’s tightly integrated with PACS.

Integrating Systems and Care-givers

Another must was connecting to the existing enterprise imaging system to open up access to all types of images such as brain MR’s and PET-CT’s that can be helpful in breast cancer staging and treatment. They also needed to be able to seamlessly archive studies and prefetch prior exams from the enterprise PACS.

“The fact that we could look at all modalities truly opened up our workflow,” Joe says. “It was good for mammography workflow but being able to also look at PET/CT and CT scans, ultrasounds and breast MRIs on one workstation enhanced our ability to take care of cancer patients who are more complex and tend to have more imaging over time.”

They also needed to be able to display any vendor’s

mammographic images, whether they be computed radiography, a scanned analog image, or all the different flavors of full-field digital mammography.

To be sure, they tested what ultimately became their system-of-choice. They brought in a workstation and loaded UCSF images on it, including prior images from other institutions. “I’m happy to say we were able to display all the different types of mammo images. At the time, we tested images from various vendors, DR and digital mammography, and various versions of scanned analog or digitized analog images from other places.”

Creating a new standard also meant making sure they could integrate well with UCSF’s existing enterprise PACS. That was a big deal because the enterprise PACS was not a good solution for the breast imaging workflow, Joe says. They worked through the integration challenges. “We needed engineers, experts to work with our PACS experts and figure out the hiccups along the way. Every time there’s an upgrade, there’s potential for connections to break. So, that’s the maintenance piece, and we’re grateful for the support that we get.”

The breast imaging PACS lives in front of the UCSF enterprise PACS. All of the breast imaging work is done in the breast imaging PACS while images are archived to the enterprise PACS. “It is invisible to us and works without a hitch,” Joe notes.

User friendliness was a must too. Mouse-clicks are minimal for maximum function. Shortcut keys help as do simple annotations. “It is intuitive, it doesn’t take a lot of mouse clicks to get to do something as simple as making an annotation or saving something,” she says.

Easy to use in this case also means little to no training needed. As Joe points out, she gets a new set of residents every month and a new set of fellows every year. “There’s no real formal training needed,” she says. “Everyone has found the interface very intuitive and easy to use. They sit down and pretty much can

start using it right away.”

Building Value

Along the way, the team at UCSF has learned some lessons for improving breast imaging reading efficiency with hanging protocols. Topping the list of features they value most is the ability to display images with the proper window and level to adequately compare priors from different vendors. The other thing that’s important from a day-to-day standpoint is having good display protocols that can be customized. “Breast imaging PACS is very powerful,” she says. “It can link like-images together. It can display tomosynthesis as well as 2D in specific view ports, and all of the view ports behave the same way.”

This offers a lot of flexibility in designing the display protocol the way the facility or department wants it. And as Joe recommends, “It is important for any practice to be efficient in getting a set of protocols that will minimize the radiologists’ needing to drag and drop images into specific view ports.”

And as we know, efficiency is No.1 for the radiologist. What they care about most is day to day use. How many mouse-clicks does it take to get through a study? How easy is it to set up display protocols? How consistent are they? “From that standpoint,” Joe says, “our solution has worked well.”

Joe says she can look at breast images rather than hunting for a menu item or feeling around the keyboard to find the right button to push. “All of my focus can be on interpretation, and the tools are meant to make it easier for me to do the interpretation.”

In breast imaging, it all comes down to the interpretation. With breast imaging PACS, efficiency is high and so is physician confidence. The UCSF team can even prove it with a study they published in 2016¹ that found improvements in screening mammography outcomes with comparisons to multiple priors vs. a single prior. In the viewbox world, most radiologists looked at two sets of priors simultaneously. But when

they moved to digital reading with two monitors, many folks moved to just looking at one prior. The UCSF team didn’t like that approach because they felt they would do better with two priors as the standard. The study proved their instincts correct. As they found, “comparison with two or more prior mammograms resulted in a statistically significant reduction in the screening mammography recall rate and increases in the CDR [cancer detection rate] and PPV1 [positive predictive value level 1] relative to comparison with a single prior mammogram.”

This leader in patient care has set a new standard in imaging practice and workflow with more effective and efficient imaging. The team at UCSF has improved patient care in screening and very complex cases, boosted radiologist productivity and streamlined and enhanced physician collaboration. They have optimized breast imaging workflow utilizing a system that is user friendly, innovative, flexible and fully integrated. And they have built a dedicated breast-image-enabled EMR that amounts to a better mousetrap with far fewer mouse-clicks.

“We wish we could have more systems like this and have it everywhere,” Joe says. “I admit, I even look at non-breast images on the workstation just because it’s so easy to use.”

¹American Journal of Roentgenology. 2016;207: 918-924. 10.2214/AJR.15.15917