

A Tale of Two CRs: Hospital Conducts Side-by-Side Test

By Shelly D. Fawver, R.T.(CV)

EXECUTIVE SUMMARY

- While we elected to install a digital radiography system in the busiest exam room in emergency room (ER) suite at our 535-bed hospital, we selected computed radiography as the primary platform for digital capture throughout the facility because of its flexibility, productivity and cost-effectiveness. We now use CR systems to handle six exam rooms and portable exams conducted by the radiology department, as well as imaging studies conducted in two ER exam rooms.
- Before committing to a CR vendor, we conducted an eight-week, side-by-side pilot study with two vendors' systems. One CR system was located in the emergency room and the other unit was located in the main radiology department. Our staff received education and training from both vendors.
- I led an evaluation team that included representatives from the radiology group, the information services (IS) department, biomedical engineering, staff physicians, ER physicians, pulmonologists and orthopedic specialists. Our team met to design the trial and develop a list of factors that technologists would use to evaluate the two systems.
- The team met after installation and again after the trial was complete to provide verbal input on each vendor for each category and to review feedback from the technologists' survey. Categories included image quality, interactions with each vendor's sales and service staff, workflow, time studies, durability of cassettes and plates, entry of John Doe patients for ER, and other factors. After the trial, we chose a system by unanimous vote.
- We learned a lot about CR technology throughout this process. Overall we are extremely satisfied with the platform we selected and with this method of evaluating the two systems prior to making this important decision.

As part of our 535-bed hospital's strategy to move into the Electronic Imaging arena, we evaluated PACS, Digital Radiography and Computed Radiography systems. While we elected to install a digital radiography system in the busiest exam room of our ER suite, we selected computed radiography as our primary platform for digital capture throughout the facility, due to its flexibility, productivity and cost-effectiveness. We now use a CR system in our Main Diagnostic Department to support six rooms and two portables, as well as the two rooms and two portables in our Emergency room department.

Before committing to a CR vendor, we conducted an eight-week, side-by-side pilot study with two vendors' systems. One CR system was located in the emergency room and the other unit was located in the main radiology department. Our staff received education and training from both vendors. I led an evaluation team that included representatives from the radiology group, the information services (IS) department, biomedical engineering, staff physicians, ER physicians, pulmonologists and orthopedic specialists. Our team met to design the trial and develop a list of factors for evaluation.

We developed a written survey for the technologists that asked them to rate the following:

- workflow (the number of steps required to perform the exam),
- user interface and simplicity,
- training,
- image quality,
- interactions with each vendor, and
- speed of the system.

The team met after installation and again after the trial was complete to provide verbal input on each vendor for each category, and to review feedback from the technologists' survey. Categories included image quality, interactions with each vendor's sales and service staff, workflow, time studies, durability of cassettes and plates, entry of John Doe patients for ER, and other factors. During the last meeting, the team chose one system by unanimous vote.

Our examination of image quality was especially rigorous. In addition to reviewing imaging studies from both systems, we also evaluated imaging studies conducted on patients who had an exam performed in the ER and again as an inpatient. This allowed us to evaluate the images captured by each vendor's CR system on the same patient.

Because this was a trial, technologists had to manually input patient information. Each vendor reviewed the process that would be required when the system was interfaced with our HIS/RIS systems with the staff. We also talked to other customers from both vendors about their worklist management features.

During this trial, we discovered significant differences in ease of use, image quality and workflow issues between the two systems. Based on our experience, we think it's wise for radiology staffs to consider the following factors prior to installing CR technology.

- Maintaining efficient workflow with CR technology requires eliminating bottlenecks that can occur at CR workstations. Remote operations panels are a huge advantage, because they allow image review and patient/exam identification tasks to take place in the exam room, instead of at a central CR workstation.
- Being able to support worklist management is also essential to maintaining high productivity and eliminating data entry errors. We talked to other customers to ensure that the CR platform we selected would interface well with our existing PACS and RIS systems.
- An easy-to-use touch screen is preferable to keyboard entry. We also wanted the ability to perform rush "John Doe" exams and then identify the patient when that information becomes available. It's also helpful if thumbnail images of the exams performed are inserted into a single folder, instead of having a folder for each image.
- Image enhancement software should be evaluated by radiologists and representatives of your key referring specialties. In our case, orthopedic physicians are a major source of referrals, so we asked both radiologists and orthopedic specialists to evaluate the quality of images from both systems. Orthopedic surgeons reported that the diagnostic quality of CR images was actually superior in some cases to our previous radiographic film images. Radiologists reported significant improvements in chest images, as well as greater consistency among all images in general. Radiologists also reported that the viewing software's "black surround" feature helped reduce distractions and eye fatigue.
- The design of the CR plate reader can greatly influence the durability and quality of the images. The path of the cassette during reading needs to be as short and straight as possible. Any bending creates wear and tear on the cassettes and can shorten their life.
- Design of CR cassettes should be durable and require low maintenance. We talked to several facilities and found that they had to clean their cassettes each week to prevent artifacts. That is a significant time commitment that we

wanted to avoid. We felt historically that one vendor's cassettes held up well to the day to day abuses and, since implementation, we have found that to still to be true. Also, by design the plates receive limited exposure to the environment.

- Service programs that allow biomedical engineers or other employees to undergo vendor training and perform preventative maintenance and first response service provides cost savings and can improve response times.
- A tracking system needs to be provided for all elements in the imaging chain, including the individual cassette, technologist, patient and exam identification number, and the CR system. We have a bar code system that records this information so that when an artifact appears, for example, we can examine the individual cassette and quickly determine the source of the problem.

Conducting a side-by-side trial of two leading vendors appears to be somewhat unusual. However, we learned a lot about CR technology throughout this process. We also learned how to design a departmental solution that increases productivity and expedites a faster workflow. Overall, we are extremely satisfied with the platform we selected and with the methods of evaluating the two systems prior to making this important decision.

Images from our CR systems, DR system and all other digital imaging modalities, are forwarded to our PACS for reading, distribution and storage. We believe that combining CR and DR technologies provides the greatest productivity gains at a reasonable cost. Both technologies produce excellent image quality and support an efficient digital workflow that have and will equip us to handle continued growth in Imaging Services. 🌱

Acknowledgements

The author would like to thank Eastman Kodak Company for their help in preparing this article.

Shelly Fawver is clinical director of imaging services at St. Mary's Medical Center in Knoxville, Tenn. She graduated of the Wastenaw Community College in Ann Arbor, Mich., with an associate's degree in radiologic technology. Fawver is a member of AHRA and may be contacted at afawver@stmaryshealth.com.



After conducting a pilot study, St. Mary's Medical Center installed CR systems (pictured) in its radiology department and emergency area.