

## PACS & EMR Integration: Carilion Clinic Improves Speed, Connectivity and Access

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It was early 2015 when the team at Carilion Clinic decided they had outgrown their PACS and needed to replace their decade-old system. Software lockups were all too common, and they needed to amp up their capabilities to read and manipulate larger, more complex studies. They wanted greater speed, performance and leading-edge applications inside hardware and software that played well with their Epic EMR. Also on the must-have list for this Health Care's Most Wired winner eight years in a row

were advanced visualization software, better integration and refined workspaces for the radiologists. Sectra PACS fit the bill.

Carilion Clinic is a not-for-profit healthcare organization based in Roanoke, Va. Through a network of seven hospitals, primary and specialty physician practices, they care for nearly a million Virginians. Across the network, the radiology department completes about 510,000 exams and procedures each year in all subspecialties of radiology. They are supported by 37 employed radiologists, 70 percent of whom are fellowship trained. Since rebooting the program with new staff in 2008, exam volume has doubled.

More exams mean more need for speed, and leading-edge functionality too. "What we noticed as we did more complex studies and the data sets became larger was that the necessity to manipulate data for specific workstation functions was causing significant performance issues for the old system," recalls Chief of Radiology Evelyn Garcia, M.D. "With these large data sets, it would lock up. The radiologist had to shut it down, boot it back up and sign back in. That type of disruption when you are dealing with a complex pathology can be very problematic. It disrupts your train of thought and we want to be very specific and accurate in these interpretations. It was causing significant issues for the interpreting radiologists." And while the radiologists, to their credit, were very good at restarting the system, going back to the beginning and being cer-

tain that they had looked at and reviewed all of the necessary imaging data, that was clearly not the way radiology should be working.

Like most new PACS searches, they formed a PACS steering committee that included leadership such as the CIO, senior VP of community hospital, vice president of radiology, chair, vice-chair and the vice president of their Technology Services Group. They also included ordering subspecialty physicians, such as cardiology and orthopedic surgery.

Besides speed and durability, greater integration with their Epic EMR was a priority, as was a new PACS that would work well with their existing teleradiology set up, vendor-neutral archive, universal viewer and voice recognition system that were staying put. "We have Epic in all of our inpatient and outpatient facilities, and so with a unified EMR, our aim was to have more integration with the EMR," says Lisa Mitchell, M.B.A., senior director of radiology. "We wanted information more readily available within the PACS, improving image quality and advanced visualization modules and setting a platform that would carry us for years to come."

It also had to work well for technology support and the PACS administrators, Garcia chimes in, "because they're the ones that are going have to support it. If it's a system that's problematic on the back end, it doesn't matter how good the front end is for the radiologists."

### Writing the RFP

The steering committee put together a very extensive RFP that included specific parameters around integration, performance and metrics, namely integration with other systems, bi-directional interfaces, education and service, system support, image and interpretation advancements, performance and reporting capabilities. All subspecialty needs had to be addressed, including interventional radiology, neurointerventional, mammography, diagnostic radiology, nuclear medicine and ultrasound and system functionality, including everything from tomosynthesis to vessel mapping to measuring organ and 3D volumes, multi-planar and MIP reconstructions.

Carilion opened the search to about seven vendors they had canvassed at RSNA, with the RFP process helping to narrow the search

to a small handful of vendors. Every radiologist in the practice had the opportunity to go through a roundtable, hands-on experience with each vendor. From that forum, they distilled the choice down to four vendors. Next came the physician test drive. Radiologists in different specialties spent several hours using the systems.

Sectra PACS emerged as the clear choice. The final decision was made based on the physicians' input and hands-on experience. "The decision-making was put in the hands of the radiologists," Garcia says.

Sectra PACS is a multi-modality, multi-vendor workstation that enables the review of any type of image from the same workstation. It also allows instant access to all the tools needed for both reviewing studies and documenting reports—including intelligent display protocols, 3D rendering, advanced visualization tools, embedded speech recognition, rich reporting functionality and structured report templates. Functionality is not hindered by geographical or organizational distances as information is shared across the enterprise.

The PACS works well in a data-intense environment, providing fast transfer of data regardless of the size of the image set. An image-handling model makes it possible to start working with the images just as quickly regardless of the size of the data set. User-configurable shortcuts and hot keys limit the number of clicks required to read exams. The system also offers different viewers access from both tablets and workstations, thereby meeting the needs of different clinical specialties such as radiology, breast imaging, orthopedics and cardiology.

## On the road to implementation

Another Carilion team—dubbed the all-wheel-drive team, made up of the PACS administrator, technologist and physician super-users—went to work along with Sectra to build the requirements of the system and how it was going to operate alongside their existing systems. They detailed every nuance of workflow and included the radiologists and section chiefs. Implementation began about a year after the initial contract was signed. The first facility went live in April, the second and third in June and the last two hospitals in July. Staging moved from smaller community hospitals to the largest medical center. The implementation crew of super-users provided training and support at all facilities. A robust education plan made it a priority to train radiologists one on one.

"Boots on the ground," as Garcia calls it, was a big success. "Whether it was the radiologists or the technology support group or the PAC admin group or the technologist," Garcia says, "we had boots on the

ground with the patients at each location to ensure that the implementation was complete and functional without issues."

The whole process went very smoothly, Garcia and Mitchell agree. "It was far easier for the physicians than even we anticipated," Garcia notes. "Training was very quick. In no time, they were saying they were glad to have the new system. That is not often the case with a new system, so it was great."

In fact, the site and radiologist with the least PACS experience went live first. Garcia and Mitchell were holding their breath when they arrived about two hours after the PACS went live. "When we turned the corner into the reading room, our physician had a big smile on his or her face and said it was already better than the old PACS. That was a big relief. We knew we had made the right decisions," Garcia says.

From the technical side, turning the system on one site at a time went very well, Mitchell says. "We were able to see each hospital go through the conversion and identify opportunities, and then move forward."

Physicians now benefit from specialty specific viewing of images and relevant EMR data. They see what they need to see. "Based on the radiologist specialty, the credentials are built for their log on," Garcia explains. "The landing page in Epic opens the appropriate information tabs for that radiologist subspecialty." Images are resident in PACS and access is always instantaneous.

Communicating noncritical results also is easier. Within the EMR, radiologists can send provider-to-provider messages immediately and document them in the report. "It is a plus for them to have the information right and not have to go into a separate email or be interrupted by a phone call," she notes.

While the team thought they had considered everything, one piece that fell off their radar was external clinician viewers. While they work through a permanent solution, clinicians with need are viewing images in the PACS environment. "The lesson learned would be launching an enterprise-wide viewer that pre-dates your PACS at the same time that you're watching a PACS change," Mitchell says. "That was a heavy lift for the organization."

Thankfully that was the only glitch; the rest of the planning and deployment has been smooth sailing. "It is a much more stable platform, which is wonderful," Garcia says. "I'm the reader for our structural heart valve program and the study data sets are very large. It was one of those tools that we chronically had to restart in the middle of studies using the old PACS. I do not have that issue at all. To quote several radiologists, it is 'lightning fast.'"

Overall, the new PACS has achieved the efficiency and stability Carilion needed. No more lockups mid-study. Throughput has improved, as has diagnostic confidence in sequentially reading images step-by-step sans anxiety. Another big positive is being able to select key images for clinicians, aiding in diagnosis, therapy and physician-to-physician or -clinician communication. Carilion has also appreciated the “degree of engagement and responsiveness of everyone at Sectra,” Garcia says. “When we had questions or we needed something, the turnaround time was amazing and the level of involvement and the willingness to get the right people on a conference call or in a room was very impressive.”

The project has been good so far. Radiologists are happy and so are referring physicians. In December the Carilion team will implement the last PACS capabilities, such as CT colonography, lung nodule tracker and dose tracking. Tightening up integration is also a goal, with each specialty having very section-specific patient information next to the images. They also are focused on continued growth.

“Being completely interconnected by a PACS gives us the luxury of having some excellent general radiologists in our community hospital, and the benefit of access to subspecialty fellowship-trained radiologists from the community hospitals. Patients always have access to what they need without having to travel far. We needed one PACS, integrated with our EMR, to do all of that. We got the capabilities and speed we lacked. Sectra has done everything we needed.”