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[Feature]

Picture of Health

The use of digital imagery begins to expand beyond radiology.

By Karen D. Schwartz

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Photo: Robert Houser

“Our computers are all on the same network as the rest of the Air Force, so they have to be as secure as any other computer,” says Tech. Sgt. Leland B. Stedje, PACS administrator at the David Grant USAF Medical Center.

Medical treatment at government facilities is vastly different today than it was even five years ago, given technology advances that have rendered hand-carried X-rays and MRIs almost obsolete.

Today, healthcare facilities from the Veterans Affairs Department and the Defense Department to the National Cancer Institute and beyond rely on networked digital imaging systems that let doctors and other health services providers across the country or the world consult on a patient’s diagnosis while looking at the same images — be they X-rays, MRIs or CT Scans. These picture archiving and communications systems (PACS) can give radiologists, emergency room doctors, specialists and family health professionals access to patient images, no matter the location.

With a steady growth of PACS predicted, the next step will be expanding from radiological services to dental, cardiology, orthopedics and more, says Chris Schutz, senior marketing analyst for Millennium Research Group of Toronto, Ontario.

“The goal is to be able to capture anything with an image with a PACS and manage everything centrally,” he says. “A lot of healthcare organizations want to get to the point where they have full telemedicine capability.”

The Pay Off

The benefits are clear: fast diagnosis, permanent storage of images and better security. For government organizations, the benefits may be even greater. Because military members change locations frequently to take on new tours of duty, it’s critical for medical records and images to be accessible wherever they go.

Plus, many VA and DOD medical facilities serve a wide swath of users.

Take, for example, the David Grant USAF Medical Center at Travis Air Force Base, Calif. The center provides radiology interpretation services to 16 DOD healthcare facilities across the United States. After implementing PACS in 1998, the entire medical network David Grant serves was able to reduce the number of radiologists employed. Today, none of the 16 facilities has a radiologist on staff; instead, a team of radiologists with various specialties reviews images for doctors at the local hospitals, saving time and money while providing expert interpretation.

“Onsite, we use PACS to provide on-demand viewing of diagnostic images to our providers from any PACS workstation or from a PC on a web browser, in addition to our teleradiology services for other DOD medical facilities,” explains Tech. Sgt. Leland B. Stedje, PACS administrator at David Grant.

At the VA, PACS has allowed even more sweeping consolidation. Clinicians at all 140 medical centers use a VA-developed PACS called VistA Imaging that handles images from all specialties. VistA Imaging is fully integrated with the Veterans Health Information

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Systems and Technology Architecture (VistA), an enterprisewide information network that provides a comprehensive electronic health record for each patient in the medical system.

Because VA's PACS is part of VistA, "the system captures clinical images as well as scanned documents, video and other nontextual data files, making them part of the patient's electronic health record," says Dr. Ruth E. Dayhoff, VistA Imaging director for the Veterans Health Administration.

VistA Imaging integrates all images and reports with each patient's electronic health record, she says, making that information accessible to clinicians nationwide. VA's clinicians are directly involved in the development process, assisting in defining requirements and priorities, she adds.

Anatomy Lesson

A PACS is, in many ways, greater than the sum of its parts. The engine of the system — the software — forms the base, but the technology that surrounds it is what makes the system work and support users seamlessly.

The software resides on a primary server (or group of servers) with plenty of power, scalability and security, such as an HP ProLiant DL380 G5 Quad-Core Xeon server. Generally, these servers are Intel-based, running Microsoft Windows or Linux. Besides a PACS engine, the server generally includes a database — such as SQL Server, Oracle or whatever the organization already uses — to help manage and track patient images.

The server supports users on desktop and thin-client devices, such as those from Hewlett-Packard, Wyse Technology or Lenovo, who view images on razor-sharp, medical-grade displays, such as those from Barco or Eizo

Nanao Technologies.

Choosing a PACS-compatible display is particularly important when it comes to reading medical images, because the smallest details are often the most important, says Hideyuki Honda, product marketing manager at Eizo Nanao Technologies. (*Read a review of the Eizo FlexScan MX300W LCD, [click here.](#)*)

"You can't use just any monitor for a PACS solution; it has to be designed for medical use," he explains. "The monitor should have medical safety standards built in and the capability to be calibrated to the ideal settings for viewing medical images. The right monitor will offer refined rendering of subtle shadings, be a unified display between multiple monitors and be consistent over time."

Another critical component is storage because images must be kept for dozens of years, yet be readily accessible to doctors. A system typically consists of two storage tiers: primary and secondary. Primary storage, where recent images are stored, often relies on a network-attached storage or storage area network device, such as those sold by Emulex, Hewlett-Packard, LeftHand Networks or QLogic.

When an image is no longer in regular use, an organization often moves it to secondary storage. Such storage, often offsite, is a lower-cost alternative to long-term storage. Even so, the ability to access these images on demand remains key, says Frank Orlando, HP's manager of health alliances. "You want to be able to push the images into an archive and have a clinician from another hospital be able to access them quickly," he says. "And you want something that allows for encryption, so security can never be compromised."

In the case of HP's Medical Archive solution, which can store images from different PACS, the engine is designed to be a back end to the system. The gateways will accept information only from authorized IP-addressed servers, and the system also allows for layered encryption.

Safe and Sound

Security also plays a crucial role. In addition to the strictures of the Health Insurance Portability and Accountability Act (HIPAA), which imposes its own security requirements, many agencies have additional security restrictions.

That's certainly true at the Air Force's David Grant facility. "Our computers are all on the same network as the rest of the Air Force, so they have to be as secure as any other computer because we need to avoid any sort of compromise," says Stedje. "So we have to make sure these companies pass the security requirements necessary, and that's fairly expensive, so not every company can do that. That limits the brand pool we can look at, but it's important."

Questions to Guide a Picture-Perfect PACS Procurement

- Does it make images available across multiple locations and provide for disaster recovery?
- Does the system provide the functionality that the radiologists and clinicians really need?
- How quickly will the images appear on the clinician's screen?
- Is long-term storage included?
- How much data can be stored online before it has to go to long-term storage?

- What sort of maintenance or system support is offered?

Standards Can Make or Break the Deal

When it comes to government healthcare, standardization is critically important. Not only are federal employees — particularly military personnel and doctors — highly mobile, but organizations with consulting physicians are likely to have systems and networks that differ from one another.

That's why it's so important for government organizations to confirm that any Picture Archiving and Communications System or PACS component they purchase be compliant with DICOM (Digital Imaging and Communications in Medicine), an industry standard that allows any image in a DICOM format to be viewed or sent to any other DICOM-compliant system.

"DICOM has allowed system vendors to standardize on a common format for imaging data, leading to greater interoperability and data sharing between different systems," says Chris Schutz, senior marketing analyst at Millennium Research Group of Toronto, Ontario. That, in turn, has eliminated a lot of confusion around compatibility, allowing users to focus on functionality comparisons when selecting vendors and systems, he adds.

That's key for a PACS user such as the David Grant USAF Medical Center at Travis Air Force Base, Calif., which has a centralized PACS that shares images with dozens of affiliated hospitals around the United States.

"In the Air Force, we prefer DICOM because we deal with many different hospitals and commands, and they may be using different products," says Tech. Sgt. Leland Stedje, PACS administrator at the medical center. "If it's all DICOM, it doesn't matter where it comes from."

Virtually all PACS software is now DICOM-compliant, but it's also helpful to use DICOM-compatible peripherals, such as storage and monitors. But beware: Not all manufacturers offer DICOM-compliant equipment. Some that do include monitor vendors Eizo Nanao Technologies and Barco, and storage vendor Hewlett-Packard.

On the monitor side, for example, "it's very important to consider DICOM compliance, because in the monitor world, the ideal settings for image readings are specified by the DICOM standard," says Hideyuki Honda, an Eizo product marketing manager.

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