Experience With DICOM Interfaces at the Department of Veterans Affairs

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MEDICAL systems can provide better services if they work cooperatively, sharing data with each other as needed. Patient identification information is a critical piece of data that must be identical in all systems in order to link result data to the correct patient. Standards have been defined to provide this data in a vendor-independent fashion. Only one standard, DICOM, however, is specifically designed to handle text, images, and binary data.¹

The DICOM standard brings open systems technology to the medical imaging marketplace. The Department of Veterans Affairs has incorporated DICOM capabilities into its VistA hospital/radiology information system (HIS/RIS) architecture to be able to interface with commercial medical imaging products.²⁻⁴ DICOM is being used at the VA to transfer text and image data between the HIS/RIS and both commercial picture archive communication system (PACS) and image producing modalities.^{5,6} These capabilities allow the VA's HIS/RIS to download patient study information to the commercial medical imaging equipment and to obtain digitized images from them. DICOM will be used with the VA's internally developed VistA Imaging System to provide a high-resolution diagnostic quality medical imaging capability.

The VA's HIS/RIS DICOM interface to commercial PACS sends all ADT events (admissions, discharges, and transfers), patient demographic changes, radiology orders, and radiology reports to the PACS. The PACS, in turn, sends all images to the HIS/RIS, where they can be displayed on physician workstations. The text-only portion of this interface was installed first at the Boston VA Medical Center and has been operational there with the EMED PACS since November 1996. The same interface was installed in January 1997 at the West Los Angeles VA Medical Center for use with the

AGFA PACS. A specialization of the original DICOM message content is used to simplify text message processing. These interfaces work very well and have proven to be quite reliable and robust. The messages are transferred almost immediately, much quicker than our previous ACR-NEMA Version 2.0 PACS interfaces.^{7,8} Several other PACS vendors are currently working with the VA to support this interface with their equipment at additional sites.

The VA's HIS/RIS DICOM modality interface supports the DICOM Modality Worklist Management and Storage Services. The Modality Worklist Management Service allows the modality to query the HIS/RIS for the set of patients waiting to be examined. The modality technologist then selects the patient from the list and proceeds with the study. The patient and study data from the HIS/RIS are directly copied to the image header. The error-prone manual data entry step at the modality is entirely eliminated. The Modality Worklist Management has been tested with three vendors and was demonstrated with Picker magnetic resonance (MR) in December 1996 at the annual meeting of the RSNA.

The VA's Storage Service allows the modality to send the full image dataset directly to the HIS/RIS for viewing on diagnostic and review workstations. The Storage Service has been tested with ultrasonography, nuclear medicine, computed tomography (CT), MR imaging, computed radiology, and secondary capture modality devices from six different vendors. The VA used this interface to collect clinical images for the Department of Defense DIN-PACS contract evaluation. The VA HIS/RIS image acquisition from a CT scanner will be placed into production in March 1997. The other interfaces are scheduled to become operational in the very near future.

The VA is investigating the use of DICOM for telemedicine applications. An interface has been operational since March 1996, sending DICOM messages between the Baltimore and Perry Point VA Medical Centers over the VA's wide area network.

Our general experience with the commercial

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DICOM offerings that we have tested has been very favorable. These products were developed using toolkits that are quite mature, and interfacing to them has been fairly easy.

The use of the DICOM standard has the potential to reduce the costs of medical imaging systems by allowing open systems solutions consisting of in-house and commercial multivendor offerings. By developing DICOM capabilities in-house, the VA hopes to accrue the benefits of open system

technologies and interface commercial multivendor offerings directly to its HIS architecture. This could result both in a quicker deployment of digital imaging in the field and a significant cost savings.

The VA's experience is that DICOM is truly fulfilling its promise to bring open system technology to the medical imaging marketplace. It is hoped that the VA will deploy many DICOM applications on a large scale across its entire hospital system in the near future.

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