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Adopting an enterprise imaging strategy:
Benefits for hospitals, referring physicians and patients

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Introduction

A car accident victim with head injuries is rushed by ambulance to the nearest hospital, where he is given a CT scan of the head. After reviewing the scan, the A&E doctor decides that the patient needs a higher level of care than the local hospital can provide. The patient is transferred to a level 1 trauma centre along with a CD of the scan. However, the trauma centre's picture archiving and communication system (PACS) cannot read the CD, so the patient undergoes another head CT scan.

The manual process of sharing diagnostic images on CD delayed treatment for an injured patient, exposed the patient to unnecessary irradiation and required a duplicate test. If the local hospital had an enterprise imaging strategy in place, its A&E doctors would have been able to send the CT image to the trauma centre electronically in a standardised format in real time. A radiologist at the trauma centre could have used their native system to quickly determine that trauma-level treatment was not necessary. The patient would have received care without delay and would have avoided additional, potentially harmful radiation without incurring duplicate costs.

$100 billion of annual healthcare costs relate to diagnostic imaging tests – but an estimated 35 per cent are unnecessary scans. That translates to $35 billion in unnecessary costs for US patients and insurance providers.

Although this example is fictitious, it illustrates an all-too-real scenario that plays out in hospitals, A&E departments and specialists' offices across the country every day – and the statistics illustrate the seriousness of the situation:

· In 2009, the National Council on Radiation Protection and Measurements (NCRP) reported that US patients' exposure to ionising radiation – delivered through millions of CT scans and other radiation-generating procedures performed annually – has almost doubled over the last 20 years.[1]

· According to a study published online in Radiology, from 1995 to 2007, the number of visits in the US in which a CT scan was performed increased 6-fold, from 2.7 million to 16.2 million, representing a growth rate of 16% per year. The percentage of visits that were associated with a CT scan also increased substantially, from 2.8% of all visits in 1995 to 13.9% of all visits in 2007.[2]

· CT emits a powerful dose of radiation, in some cases equivalent to about 200 chest x-rays.[3]

· According to the American Society of Radiologic Technologists, healthcare organisations generate close to 600 million diagnostic imaging procedures annually.[4]

· Research and anecdotal evidence alike build a strong case for why diagnostic images should be easily accessed and shared electronically across healthcare enterprises, regional healthcare information organisations (RHIOs) and state-wide health information exchanges (HIEs). Why?

1   National council on Radiation Protection & Measurement,"NCRP Report No. 160, Ionizing Radiation Exposure of the Population of the United States", June 2015.
2   Medscape, "Use of CT Scans in Emergency Departments'Skyrocketing", December 2010.
3   Consumer Reports, "The Surprising Dangers of CT Scans and Xrays", January 2015.
4   HIMSS, "Adopting an Enterprise Imaging Strategy: Benefits for Hospitals, Referring Physicians and Patients", 2018.

Diagnostic images make up a critical part of the diagnosis process. Yet today, the most common way they're exchanged among providers and referring physicians is by making a copy of the image onto a CD and giving it to the patient to take to the next appointment at a specialist's practice or a hospital – an inefficient process that lends itself to human error and the risk of the CD being unreadable on the facility's PACS.

Although many healthcare systems already have PACS for electronic image management capabilities, these are proprietary, closed systems that do not allow providers to easily share information between departments, facilities and entities. Plus, sharing images electronically with referring physicians outside of the system is difficult if the two facilities have different PACS vendors. To do so would require a prior implementation of a solution to morph the studies so that they could be viewed on the receiving system. Many of these approaches require the implementation of specialised hardware and software at the sending site, which can create a cost that is not sustainable by the receiving centre.

It's time to adopt a new vision for an enterprise imaging strategy that focuses on providing electronic access to any medical image, anywhere, at any time. Current trends in patient safety and healthcare reform, as well as competition for referring physicians, are driving the need for this new paradigm of image sharing. The right strategy aligns with business needs, integrates with existing EHR and PACS, and incorporates three critical components.

What is an enterprise imaging strategy?

An enterprise imaging strategy must focus on providing access to any type of medical image, anywhere, at anytime by anyone – provider, referring physician, radiologist, patient, etc. – across the continuum of care in healthcare systems, RHIOs and state-wide HIEs. This new vision goes beyond PACS to make image sharing truly interoperable and accessible in real time on any approved browser-based electronic device – without having to load and support additional

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software and without the complicated and unnecessary movement of data.

Three components are critical to the success of an enterprise imaging strategy, which can be implemented individually or as a comprehensive solution: a standardised vendor-neutral archive (VNA), an intelligent digital image communication in medicine (DICOM) gateway and a universal viewer that can be accessed via an embedded link or a stand-alone portal that enables viewing of images on any browser-based electronic device.

VNA – High availability for images

A VNA goes beyond the traditional process of archiving in PACS to create a centralised, standardised, consolidated system that holds and manages the lifecycle of all images from each individual silo across multiple PACS, sites and specialities. This system morphs all DICOM headers into a standard format so that any of the DICOM viewers within the healthcare network can display the images, regardless of which PACS originally held the image. Consequently, the images are much more accessible to the healthcare network's physician community at large.

Although VNA is called an archive, it is so much more than image storage because the system keeps track of all types of diagnostic images for all patients. For example, a physician can quickly access all patient images from cardiology, neurology, orthopaedics and other medical departments in a single system, at one time. This patient-centric approach saves time for the physician, supports the faster delivery of care for the patient and guards against duplicate imaging.

A VNA also manages the lifecycle of images – making it easier and more cost efficient to comply with regulations regarding patient information archiving, such as the security policies issued through HIPAA in 2005, which require a disaster backup and recovery plan for all stores of patient data.

Intelligent DICOM gateway – Eliminating the need for CDs

While the VNA simplifies the sharing and archiving of images within a healthcare network, integrating an intelligent DICOM gateway to read studies coming in from outside of the enterprise is the next step in an enterprise imaging strategy. Since the intelligent DICOM gateway can receive images in real time, it eliminates the need for providers to create image CDs and for patients to hand-deliver them to specialists. To send an image, the referring physician simply drags and drops the file onto the intelligent DICOM gateway's Web address. Once received by the gateway server, the image is morphed into the receiving location's native PACS format, and a notification is sent to the physician that the study is available for review in their native system. Doing so can decrease the time to treatment and can lower the incidents of duplicate testing. Images that come to the facility on CD can also be uploaded using the same intelligent DICOM gateway. Once viewed, the physician will have the opportunity to delete the study or store it for future reference.

Regardless of the way the images are accessed, this facet of an enterprise imaging strategy makes it easier for specialists and referring physicians to do their jobs without changing their normal workflow. Patients benefit by receiving faster, more informed care that leads to fewer duplicate tests and reduced radiation exposure.

Zero-download DICOM viewer – Fast, easy access to images anywhere

The third critical piece is a zero-download DICOM viewer to support the viewing of images in the VNA or other DICOM archives. Since it is a zero-download viewer, users do not have to spend valuable time downloading software, applets or scripts in order to access the DICOM viewer on their personal computers and other approved devices. Importantly, a zero-download solution eliminates the need to constantly upgrade or reconfigure the viewer when new versions of assisting software applications, such as Flash or ActiveX, are released, resulting in lower IT and support costs.

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Why healthcare systems need an enterprise imaging strategy

The question is not if, but when a healthcare system should implement an enterprise imaging strategy that provides access to any image, anywhere, at any time. There are many drivers that hospital CEOs, CIOs and physicians can no longer ignore: patient safety issues around radiation exposure; new Medicare policies to reduce reimbursement and foster information sharing; competition to retain the best physicians; the push for an interoperable system of EHRs across healthcare systems, HIEs and RHIOs. Let's examine these in more detail.

Compliance with patient safety initiatives

Today, individual states are starting to take unilateral action to create legislation and IT strategies to help eliminate the increased radiation associated with duplicate imaging tests. The states of Maine and Alabama are the first to include the sharing of diagnostic images, in addition to the PDF files of radiologist reports, in their state-wide health information exchanges (HIEs). California passed its Patient Safety Radiation Act in September 2010, which calls for strict documentation of every imaging exam performed in the state's hospitals and doctors' practices. For example, the information must include the type of imaging study, the date it was performed, the type of equipment used, the equipment settings, the patient's body mass index (BMI) and the names of the patient, doctor and the imaging personnel who performed the test. If the federal government enacts a similar law, then hospitals and practices with a VNA as part of an enterprise imaging strategy will be one step ahead in the race for compliance.

Trend toward reduced reimbursement

Imaging is moving from being a profit centre to a cost centre as Medicare, Medicaid and some private insurers begin to decrease reimbursement for duplicate tests. Another case in point is Medicare's proposed launch in 2012 of its Gain-Sharing Programme, which gives physicians, group practices, networks, health centres and other providers the option to create an accountable care organisation (ACO) model. Patient-centred

care delivery, advanced care coordination and information sharing are three key areas of focus for ACOs, with the goal of improving the quality of patient care and eliminating unnecessary costs. An enterprise imaging strategy as described in this white paper, with its focus on reducing the radiation risks and unnecessary costs of duplicate testing, would fit well within an ACO model.

Competitive advantage to attract and retain physicians

A physician with a strong patient following can generate approximately $1.5 million in annual revenue for a hospital. Therefore, making image accessibility easy and physician-friendly is a competitive advantage because it makes it easier overall for the physicians to do their jobs, leading to greater job satisfaction and loyalty. Using a system based on the enterprise imaging strategy described in this paper, referring physicians would have access to the full diagnostic image and the tools to study it, not just the PDF of the radiologist's report. In addition, diagnostic imaging review fits seamlessly into their workflow since they can access and study all of the patient's images within their current EHR.

Stop flow of outside CDs to reduce IT operational costs

Hospital IT departments often need to maintain a separate system and staff just to manage the deluge of outside image CDs that pour in from referral patients and providers. Yet only about 80 per cent of the CDs can be uploaded and read without additional IT involvement. The time spent troubleshooting the other 20 per cent of CDs that are difficult to load can translate to lost productivity and higher IT costs – and that can lead to delays in patient treatment. Since an intelligent DICOM gateway as part of an enterprise imaging strategy would eliminate the need for IT involvement, costs would be reduced and resources could be freed for more value-added core IT projects.

Trend toward greater patient accessibility to personal health information

As patients demand more accessibility to their health information, hospitals may one day provide patient access to images through personal web-based devices that can interface with the hospital's enterprise imaging system. Patients could control access to their records and provide physicians with permission to view their images. While this trend is likely to occur further in the future, hospitals and physician practices should be aware of this emerging new paradigm and be prepared to respond to their patients' increasing desire for permission-based access with a flexible, easy-to-use enterprise imaging system.

Getting started

Not surprisingly, many healthcare management leaders believe that a password-protected PACS system is enough to fulfil the requirements for streamlined sharing and storage of diagnostic images. But physicians are tied to an office computer to use it – there is no remote access on rounds, at home or via other approved devices. What's more, a single PACS cannot give physicians a patient-centric view of all of the patient's images across the continuum of care, nor is there a guarantee that the system will read images from other PACS.

The idea, of course, is not to lessen the value of PACS, which have quietly revolutionised the diagnostic process. But hospitals and doctors' practices must be prepared to do more with their existing or proposed PACS systems through an enterprise imaging strategy. However, implementation should not be a one-size-fits-all proposition. Here are a few important considerations to help organisations get ready for adopting an enterprise imaging strategy for an "any image, anywhere, any time" approach:

· Establish the business requirements that are most important to the enterprise. These might focus on attracting and retaining physicians, improving patient safety through reduction of radiation exposure, reducing IT costs or attracting new patients. Prioritise the requirements and let that be the roadmap for the enterprise imaging project.

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- Keep it simple. Determine which component(s) – VNA, intelligent DICOM gateway or zero-download DICOM viewer – you need to implement first to meet your most pressing business requirement.

- For example, a hospital competing for top physicians would want to offer image accessibility that is flexible, easy to use, secure, and available on approved devices. A good place to start an enterprise imaging strategy to support this goal is with a true zero-download DICOM viewer solution that can retrieve images from all archives, even without a VNA.

- In another scenario, trauma centers or speciality facilities that want to stem the flow of outside CDs with patient images could launch their strategy with an intelligent DICOM gateway that can morph any image into any format for instant native PACS viewing. On the other hand, facilities that want to upgrade older, proprietary DICOM systems could start by moving everything to a VNA that provides standardised, patient-centric, enterprise-wide accessibility and high availability along with "plug-and-play" support for new PACS systems.

The key point to remember is that there really is no wrong way to proceed with an enterprise imaging strategy as long as decision makers fully understand the capabilities of each technology component, relate the capabilities to solving their top business challenges and look at the enterprise imaging strategy as a solution that can grow and evolve over time.

Conclusion

Adopting an enterprise imaging strategy with "any image, anywhere, anytime" accessibility is not a technology issue. The infrastructure to do it is here today. Our children are using their Wii consoles to go out on the Internet and download a feature-length movie in just minutes – the video file size of "Titanic" is 3GB, which is the same file size as an average diagnostic image of the heart. So why not give physicians the ability to do the same with diagnostic images that are critical to making fast, informed patient treatment decisions?

Hospitals are increasingly leading the way in adopting this new vision of an enterprise imaging strategy. As such, they will make the industry even more competitive as they use this strategy to attract and retain physicians, protect their patients from unnecessary radiation and reduce the impact of duplicate tests, and prepare themselves for the inevitable further declining reimbursement rates for duplicate tests. What's more, hospitals or any healthcare entity that embraces this "any image, anywhere, anytime" strategy will have a distinct advantage as they can react much faster when future advances in diagnostic imaging emerge and new patient radiation dosage regulations are introduced.

About Watson Health Imaging

Watson Health Imaging, a market segment of IBM Watson Health, is a leading provider of innovative cognitive computing, enterprise imaging and interoperability solutions that seek to advance healthcare. Its Merge-branded enterprise imaging solutions facilitate the management, sharing and storage of billions of patient medical images.

With solutions that have been used by providers for more than 25 years, Watson Health Imaging is helping to reduce costs, improve efficiencies and enhance the quality of healthcare worldwide.

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