Managing transitions of care continues to be one of the most disconnected and wasteful aspects of healthcare. These issues are beginning to be addressed through Meaningful Use initiatives by:

- Incentivizing the connectivity of certified electronic health record technology (CEHRT)
- Connecting providers with Health Information Exchanges (HIEs)
- Sharing patient records through solutions like the DIRECT Project
- Exchanging Continuity of Care Documents (CCDs) and Consolidated CDA documents

What is missing in these efforts, however, is an essential part of the patient health record: medical images. Easy and immediate access to images is often required to get the complete picture of a patient’s health and ensure that the patient has the most effective care plan. Considering that up to one-third of CT exams are unnecessary, 10% of today’s healthcare dollars go to medical imaging procedures, and between 1-2% of cancer deaths may be due to a cancer caused by a CT scan, it seems obvious that streamlining the sharing of historical medical image exams should receive significantly more attention in the Meaningful Use criteria—especially with the high costs of imaging studies and the risk of patients receiving additional and unnecessary radiation exposure.\(^1\)\(^2\) However, the perceived difficulties of exchanging medical imaging information has limited efforts intended to address this issue.

Another challenge is that images are typically held in separate silos within the information technology infrastructure of hospitals. Electronic Medical Record (EMR) systems do not natively handle diagnostic quality medical images, and existing PACS are not designed for easily sharing images around a community. Patient images are typically delivered to the next care provider on cumbersome CD and DVD media—a methodology with a lot of issues, including the fact that separate media are not connected to existing systems, are easy to lose, and have ease-of-use and speed issues as well as compatibility problems. Even some newer cloud-based image delivery solutions still manage images in a silo, are not interoperable, prove costly, and present ease-of-use issues. All of these different methods deepen the complexity of gaining access to relevant historical imaging information on a patient. And where there is resistance and complexity, there will be limited use. Ultimately, the patient pays with delays in treatment, increased costs, and additional exposure to unnecessary radiation.

What is needed to solve these issues, and ensure that a patient’s historical medical images can be promptly accessed...
Specific requests should be available in templates that allow for quick selection of the relevant records and images.

by all caregivers, is a solution architecture that anticipates and supports the need for images to be available along with the rest of the patient’s required medical history. This unified approach takes into account that images are simply part of the patient’s relevant historical medical information, and that access to these images should be part of existing EMR, PACS, and HIE infrastructures. Diagnostic quality access is required, as practitioners should not have to wonder if they are getting the “full” picture.

A unified approach includes the following solutions:

• Ability to request and receive images and all other relevant historical medical information electronically from external providers, using a single interface
• Alternatively, the ability to gain access to external image exams within the context of a patient’s information that resides in an image enabled HIE
• Ability to send patient information, including images, to consultative or follow-on care providers for a patient, via either electronic delivery or HIE connectivity
• Wrapping the requirements for relevant patient information and images with a service to assist and assure the delivery of all requested information, regardless of an external provider’s connectivity status or where in the world the information is located
• Integration of received information into the facility’s EMR and/or PACS
• Managing “unconnected” information, like CDs, to allow them to be easily accessed and potentially uploaded to the facility’s systems

Here are the workflow steps and other considerations essential for incorporating image workflow in the overall referral process.

Initial Patient Referral

When a patient is referred, the receiving facility collects information about where the patient received care and the location of relevant records and images. A web-based interface would allow for patient coordinators to access this information and request specific relevant records as to why the patient has been referred to the institution. For example, a lymphoma patient may have different record and imaging needs than a kidney transplant patient; the specific requests should be available in templates that allow for quick selection of the relevant records and images typically required for these types of patients.

Connected Providers

Connected providers have been pre-configured to access information through digital means. A simple capability must exist that allows connected providers to establish this secure connection with facilities to which they refer patients. These connections may utilize, but should go beyond sending, DIRECT messages or making a basic Continuity of Care Document (CCD) available.

When the receiving facility makes requests of a connected provider, notifications should be sent and received accompanied by a web-based worklist for requested information regarding a patient. Once these notifications or worklist entries have been processed, there must be a straightforward way to deliver the requested information to the facility. In the case of image workflow, the process must include the ability to upload images from a CD, forward images from PACS, or query/retrieve images from PACS. The best implementations include the ability to manually or automatically populate query fields for the connected provider’s PACS based upon the initial request from the facility, and to deliver the requested images without the need of a VPN connection that may be difficult to set up.

Other providers that are not connected, as well as patients themselves, have access to CDs and DVDs with images that may be needed in advance of the patient referral. In these situations, it should be straightforward to email a link to these providers and patients that allow them to perform an easy, web-based upload of the contents of the CD or DVD from their computers.

Assured Delivery

Electronic requests for a patient’s record and images are dependent upon human interaction, and therefore result in far less than 100% compliance by external providers—a consideration that is especially critical in time sensitive care situations. This is where assured delivery, which involves skilled professionals to ensure the information is delivered in a timely manner, proves crucial. It is common knowledge that 60–70% of providers require a second request, and that over 40% of the remaining require a third request, to achieve compliance on the delivery of required patient information. Assured delivery can also be used to gain patient consent when necessary.

Moreover, assured delivery can increase market share. Patients will go where they can initiate procedures or treatment faster, and they appreciate not being burdened with collecting their own records. It can also be used to access unconnected information, including all types of medical records which are organized and delivered
Managing a Patient Referral before the Appointment

A unified approach to managing relevant external medical records and images helps ensure a unified environment and streamlined workflow for accessing a patient’s information, and offers the ability to determine what should be loaded into an EMR or PACS. With a software-as-a-service cloud-based solution, all of this information can be made available in the context of a unified patient record that provides the ability to see diagnostic reports along with full diagnostic quality images. This solution allows users to further determine what information is required for patient care, and what should be loaded into internal systems, thus making the internal information more efficient and relevant for ongoing patient care.

Full Diagnostic Quality Web Viewing

Images should be viewable from within the context of the rest of the patient record—quickly, and with full diagnostic quality. The best implementations provide a zero footprint approach, which allows images to be viewed without installing an application. From a quality perspective, the viewing solution should be an FDA Class II Medical Device that is approved for primary diagnostic reading. In addition, all of the common clinical tools needed to evaluate the image should be available, including features like smart paging that take into account the anatomical position of the images, accurate measurement tools, and the ability to view multiple studies in the same viewing session. The further ability to view images in a mobile environment, such as on an iPad, supports access of this information at the point of patient care.

When images are needed on PACS—to allow radiologists to compare them with exams performed internally with their pre-set hanging protocols, or for secondary reads—the process should be straightforward. Access to internal patient identifiers, through integration with HL7 messaging or utilization of DICOM Modality Worklist (MWL), are key to ensure that this process can be carried out easily and accurately.

Hand Carried Media: CD and DVD

Patients will continue to bring CDs and DVDs with them to appointments. A unified solution incorporates sophisticated tools to upload the content of these CDs into the system, ensuring easy access. A built-in media upload tool, which can be deployed wherever a patient presents within the institution, is key. This tool should make it easy and fast to get a CD/DVD into the system. It should also allow matching up to existing patients in the institution, and assure that the local patient identifiers are assigned to the images.

The upload tool should also handle the occasional CD that is not in DICOM format or has been incorrectly stored. In such cases, a mechanism is needed that allows the contents of the CD to be uploaded to an imaging lab that can assure the CD is converted by imaging professionals to DICOM format and delivered to the caregiver in a timely manner.

Access to Images for the Entire Care Team

A unified web-based environment that provides access to images and other records for a patient should be accessible by any authorized user across the care team. Email notification rules can be set up to ensure that appropriate care providers and clinicians are made aware of new information.

The facility also needs the ability to provide image access to external consulting clinicians. This can be handled, even automatically, by sending the clinician access via email, from which they can click on a link and be brought to a full diagnostic quality view of the images within a web browser. Additional security can be put in place through a PIN mechanism that is communicated by another means.

When these images are transferred, the consulting clinicians should be provided with a real time collaboration and screen sharing capability within the zero footprint viewer. Any user who can view images in this unified environment can enable collaboration with the press of a button—and instantly, all screens show the same images, measurements, formats, zoom/pan, window/level, and other settings. In this collaborative view, every user’s cursor is visible, and manipulations performed by any user will be seen by all other users who are viewing that patient’s images after selecting the collaborate option. This shared, real time access makes it easy for the user to be on the phone with a consulting physician and, at the same time, quickly and accurately review images to determine the best possible diagnosis and treatment for a patient.

Images should be viewable from within the context of the rest of the patient record—quickly, and with full diagnostic quality.
When a patient needs to go to a new care facility for treatment, or back to the primary care physician, images and other records should follow. This unified solution includes the ability for these images to be delivered easily to care providers, allowing them to view the images or download the images directly into their own PACS.

**Conclusion**

Sharing patient medical history can be inconvenient and unreliable. Massive strides have been made to address the wasteful aspects of healthcare today, but hospitals and healthcare providers are still searching for ways to improve the efficiency of medical image sharing. A unified approach would include images as part of the patient's relevant medical history, providing access to any image through existing EMR, PACS, HIE, and cloud infrastructures. The entire care team can access images via the same unified web-based environment and download the image, if desired, to their own PACS.

Healthcare facilities can quickly and affordably use existing technologies, combined with a unified approach for sharing images to greatly improve transitions of care for their patients. Images would no longer need to be burned on to CDs and transported. Instead images are:

- Received electronically from external providers and patients in a timely manner
- Automatically tracked and if not received, alerts notify a US-based retrieval service
- Reliably accessed internally from the patients' record using a diagnostic quality zero footprint viewer or from PACS
- Easily forwarded to the appropriate PACS or VNA
- Sent electronically to any external provider with one click access to diagnostic quality viewing, real time collaboration tools, and the ability to load images to their own PACS

Furthermore, a unified approach allows healthcare facilities to:

- Organize patient records and sort them into the appropriate EMR system
- Enable a built-in media upload tool for records that are not in an electronic format
- Connect all EMRs across the organization to all department PACS
- Engage in timely communications with internal and external referring physicians

Managing transitions of care has seen some of its issues addressed by various Meaningful Use initiatives. Previously, however, these initiatives have failed to include efforts aimed at solving issues related to medical images. Finally, there are existing technologies that offer a unified approach which ensures that a patient's historical medical images can be accessed in a timely manner, by all caregivers.

**References**

3. eHealth Technologies proprietary analysis and estimates.

Ken Rosenfeld is president and CTO for eHealth Technologies. He has over 27 years of HIT industry experience which includes positions at Eastman Kodak as a worldwide business manager for HIT Enterprise Storage and Archiving and leading their $80M PACS business and healthcare information systems' global R&D organization.
Home-Study Test

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Carefully read the following multiple choice questions and take the post-test at AHRA’s Online Institute (www.ahraonline.org/onlineinstitute)

QUESTIONS

Instructions: Choose the answer that is most correct.

1. The issues of managing transitions of care are beginning to be addressed through Meaningful Use initiatives by:
   a. Connecting providers with Health Information Exchanges (HIEs)
   b. Sharing patient records through solutions like DIRECT Project
   c. Exchanging Continuity of Care Documents (CCDs) and Consolidated CDA documents
   d. All of the above

2. The acronym CEHRT refers to:
   a. Compact Electronic Health Record Technology
   b. Certified Electronic Health Record Technology
   c. Certain Electronic Health Record Technology
   d. Creative Electronic Health Record Technology

3. How many CT exams are unnecessary?
   a. 1/4
   b. 1/2
   c. 1/3
   d. 2/3

4. What percentage of cancer deaths may be due to cancer caused by a CT scan?
   a. 10–15%
   b. 5–10%
   c. 2–5%
   d. 1–2%

5. Issues with patient images delivered on CD and DVD media include the following EXCEPT:
   a. Separate media are connected to existing systems
   b. Easy to lose
   c. Ease-of-use and speed issues
   d. Compatibility problems

6. The unified approach takes into account that access to images should be part of the following infrastructures:
   a. EMR and JEB
   b. PACS, EMR, and HIE
   c. HIE and LANE
   d. None of the above
7. A unified approach includes the following solutions:
   a. Request and receive images and relevant historical medical information electronically from internal providers
   b. Separation of received information in the facility’s EMR and/or PACS
   c. Send patient information, including images, to consultative or follow-on care providers via electronic delivery or HIE connectivity
   d. Managing “connected” information

8. The first step that is essential for incorporating image workflow in the overall referral process is:
   a. Connected providers
   b. Initial patient referral
   c. Managing a patient referral before the appointment
   d. Access to images for the entire care team

9. When a patient is referred, the receiving facility collects information about where the patient received care and the location of relevant records and images.
   a. True
   b. False

10. How often do providers require a second request for a patient’s record/image?
    a. 30–40%
    b. 40–50%
    c. 50–60%
    d. 60–70%

11. To achieve compliance on the delivery of required patient information, over 40% of remaining providers require:
    a. 2nd request
    b. 3rd request
    c. 4th request
    d. 5th request

12. From a quality perspective, the viewing solution should be an FDA:
    a. Class IV Medical Device
    b. Class III Medical Device
    c. Class II Medical Device
    d. Class I Medical Device

13. All of the common clinical tools needed to evaluate the image should be available, including features like:
    a. Smart paging
    b. Accurate measurement tools
    c. View multiple studies in the same viewing session
    d. All of the above

14. Access to internal patient identifiers can be carried out through integration with:
    a. HL7 Messaging
    b. HL5 Messaging
    c. HL 3 Messaging
    d. HL 1 Messaging

15. Patients will no longer bring CDs and DVDs with them to appointments.
    a. True
    b. False

16. When images are transferred, consulting clinicians should be provided with a real time collaboration and screen sharing capability with the:
    a. Numerical fingerprinting viewer
    b. Alphabetical hand screening device
    c. A-Z body scan
    d. Zero footprint viewer

17. In the unified environment, with the push of a button, all screens can show the same:
    a. Images and measurements
    b. Formats and zoom/pan
    c. Window/level and other settings
    d. All of the above

18. When a patient needs to go to a new care facility or back to the primary care physician, images and other records:
    a. Have been deleted according to HIPPA
    b. Will need to be requested with a two week notice
    c. Should follow
    d. Are hopefully not lost in cyberspace

19. Access to images via the same unified web-based environment is available to:
    a. The entire care team
    b. Radiologists
    c. Primary care providers
    d. Large medical facilities

20. Which of the following is NOT part of the unified images approach?
    a. Images are burned onto CDs and transported
    b. Images are received electronically from external providers/patients in a timely manner
    c. Images are automatically tracked
    d. Images are easily forwarded to the appropriate PACS or VNA