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On the Horizon — The Next Generation of EMRs

By Aggie Stewart

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An EMR based on functionality, not documentation, would help speed the adoption of evidence-based healthcare, according to experts at a recent MRI-sponsored conference.



Imagine the following scenario: A physician in Chicago has an electronic visit with a patient in Miami, during which the physician accesses the patient's complete health record through a secure online application. Both the patient and physician view the record simultaneously.

During the visit, the patient takes her blood pressure, temperature, and pulse using a medical device designed to measure the readings and transmit the values directly from the device into the medical record. She and the physician discuss at some length her health concern in light of her current status and history. Together, they decide she will make temporary changes in her diet and have labs and additional diagnostic tests done at a local facility. The physician enters the orders for the labs and other tests into her record along with a prescription refill. As the physician inputs the orders, both he and the patient can see what her insurance allows and what she will have to pay after reimbursement.

Before the visit ends, he refers her to Web sites that have information about her health concern, schedules a follow-up appointment, bills her insurance, debits her method of electronic payment for the balance, and issues a receipt. Following the appointment, she updates her personal health record (PHR), which she stores on her mobile phone by downloading the visit data from the Web application. She then accesses her pharmacy's Web page, pays for her renewed prescription, and makes arrangements to pick it up later that day. She also schedules her labs and other tests and obtains the information from the doctor's recommended Web resources.

Given the status of electronic medical record (EMR) use across the U.S. healthcare system, this scenario bears more resemblance to science fiction than any reality within reach of the current patient/provider relationship.

Nonetheless, many industry experts, such as C. Peter Waegemann, CEO of the Medical Records Institute (MRI), maintain this is the direction in which the EMR is headed. "We're in the midst of a transition from intuitive medicine practiced as an art to science-based healthcare," Waegemann said in his opening presentation during a two-day, MRI-sponsored conference in late January, during which he and others analyzed the latest EMR developments for an audience of healthcare professionals and IT vendors. "The EMR is evolving from a digital paper record [that reflects intuitive medicine] to a tool that enables evidence-based, computer-guided, and computer-supported healthcare," he said.

Waegemann and other conference presenters worked from this basic concept into an analysis of current trends in EMR implementation and use, barriers to adoption, legal issues, and technology limitations and innovations.

From Documents to Data

Waegemann described three generations of the EMR. First-generation EMRs provide a document-based, digitized version of the paper chart. Although still document-based, second-generation EMRs add electronic functionality, such as results reporting, computerized physician order entry, practice management, and report generation. These extra functions operate as add-ons to the EMR's central function of enabling documentation of the care process.

In third-generation EMRs, functionality, not documents, drives the system. Rather than the EMR being organized around traditional patient record documents, such as assessment forms or history and physicals, it becomes organized around the functions—and the data needed to power those functions—necessary to provide optimal care,



such as clinical decision support, electronic prescribing, and health information exchange for the continuity of care, patient safety, and public health. In Waegemann's view, third-generation EMRs are what will make the vision of evidence-based, computer-guided, and computer-supported healthcare a reality.

Most EMRs used today are enterprise-based, first- and second-generation systems. Waegemann contended that the leap to third-generation EMRs remains as much a matter of technology evolution and standards as a mindset about format. "We need to get away from documenting in the EMR as if it were a paper record and move toward the creation of databases," stressed Waegemann.

He and other conference presenters maintained that it's the data, not the paper-modeled document formats in which they have been traditionally captured, that provide the greatest value for improving important components of care delivery, such as continuity, decision support, disease management, quality, and patient safety—not to mention workflow efficiency, public health analysis and reporting, research, reimbursement, and cost control.

In her presentation on clinical documentation capture, MRI Vice President Claudia Tessier, CAE, RHIA, encouraged conference attendees to think about how they want to use the patient data and information, then look for EMR systems that support that use. "Telling stories is not the goal. Conveying information is the goal," advised Tessier, referring to the traditional document-based approach to collecting data. "It's not the documents but the data in the documents that clinicians want."

Tessier maintained that EMRs modeled on paper records diminish their potential value because they aren't designed to take advantage of the additional functionality that they enable—functionality that relies on structured, standardized data. According to Tessier, this is largely due to the way in which the data are entered and stored. "A data approach encourages the capture of structured, standardized, searchable data and provides compact and efficient data points," she explained. She contrasted this with a document-based, narrative/free-text approach in which unstructured, nonstandardized data must be searched and retrieved.

From Tessier's standpoint, the advantages of a data approach are numerous. It encourages the use of point-of-care technology that enables one-step, concurrent documentation processes, which yield data as a by-product of the care process. Because concurrent documentation facilitates efficient, accurate, timely, and complete documentation, it enhances critical aspects of care, such as continuity of care, not to mention patient and public safety. Moreover, a data approach promotes the implementation of standardization in both terminology and data capture, which remains essential to data sharing for purposes of continuity of care, public health, and the increasing number of secondary uses of health data, such as clinical research and an ever-widening variety of quality initiatives.

Tessier pointed to the continuity of care record (CCR), an American Society for Testing and Materials (ASTM) standard that outlines a comprehensive core data set for a patient health summary, as a good example of a data approach to information capture in an EMR. The ASTM CCR standard provides a way to create flexible documents that contain the most relevant and timely health information about a patient based on data elements from the core set and send these electronically from one caregiver to another. According to Waegemann and Tessier, the CCR standard brings the EMR closer to embodying the vision for its third-generation relation.

The CCR: Comprehensive to the Core

The CCR standard was designed to facilitate continuity of care and other healthcare-related activities that rely on exchanging data, such as billing, research, and various quality initiatives. Developed jointly by the ASTM and a number of clinical and technical professional associations, including the Massachusetts Medical Society (MMS), HIMSS, the American Academy of Family Physicians (AAFP), the American Academy of Pediatrics, the American Medical Association (AMA), and the Patient Safety Institute, the CCR offers a means of exchanging data that remain both technology and vendor independent—a considerable advantage in today's noninteroperable EMR world.

The CCR can accomplish this because it's expressed in XML, or Extensible Markup Language, a way of coding text so that it can be used in various applications. XML's primary purpose is to enable data sharing across different information systems, particularly systems connected via the Internet. "XML coding allows for the import and export of all CCR data, automated CCR transmissions, data interchange between incompatible EMR systems, and CCR preparation, transmission, and viewing in multiple ways, such as Web browsers, Health Level Seven (HL7) messages, secure e-mail, or PDFs, HTML files, and word processing documents," explained conference presenter Thomas E. Sullivan, MD, past president of the MMS and cochair, along with Tessier, of the ASTM's task group for the CCR.

Sullivan's presentation focused on the CCR and its notable implementations. "[The CCR] was developed around content—a data set—not a document," explained Sullivan, who referred to the CCR as a document wannabe—a data set ready to be put into a document by a user.

Content driven, the core data set outlined in the CCR standard was adapted from the data set found in the Patient Care Referral Form required by the Massachusetts Department of Public Health for use in the transfer of patients

primarily from the inpatient setting to nursing or long-term care facilities, as well as other documents. Sullivan described the CCR's content as the "most relevant current and past administrative and clinical information about a patient's health status and healthcare treatment." This includes data regarding insurance and other financial information, advance directives, care plan recommendations, and other providers involved in the patient's care.

The CCR's technology independence allows it to be incorporated with relative ease into EMR systems, making it vendor neutral. Currently, more than 30 EMR and PHR systems vendors either have implemented the CCR standard or committed to incorporating CCR input and output capabilities into their systems. Moreover, the Health and Human Services (HHS)-funded Certification Commission for Healthcare Information Technology (CCHIT) has included CCR functionality in its testing criteria for interoperability of ambulatory EHR systems.

According to Sullivan, other CCR implementations include a project conducted between MinuteClinic, a subsidiary of the retail pharmacy corporation CVS, and the AAFP to field test the CCR standard in family physicians' offices, as well as in MinuteClinic sites, and a PHR project sponsored by San Francisco-based Medem Inc., an organization founded by the AMA and several national medical specialty societies to develop and provide secure online communication services for use by physicians and other healthcare providers, such as hospitals and health systems, with their patients.

While considerable energy and momentum have been behind the ASTM CCR standard, it has not existed in the industry without rival, namely HL7's Clinical Document Architecture (CDA), which included the CCR-like component Care Record Summary. After more than two years of collaboration between ASTM and HL7, the two standards were harmonized in February through the creation of the Continuity of Care Document (CCD).

"The HL7 ballot [to approve the CCD standard] was successful, and the CCD has been endorsed by ANSI's [American National Standards Institute] HITSP [Healthcare Information Technology Standards Panel]," reported Sullivan, adding "and it's likely that CCHIT will do the same."

Because the CCD will be a component of HL7's CDA, only HL7 members could participate in the ballot. The HITSP endorsement is significant for its role in HHS's larger standards harmonization effort aimed at facilitating interoperability and data exchange.

Sullivan also talked about the emergence of PDF/H—Portable Document Format for Healthcare—as a standard.* Based on the PDF standard, PDF/H is a modified PDF format for healthcare that offers a portable, secure, and universal data exchange container for EMRs and PHRs. "Criticism that CCR is not a document will be resolved by the entrance of PDF/H," asserted Sullivan, referring to the CCR's ability to be viewed in various document formats, such as PDF.

The PDF/H will offer other advantages to help ease the transition from paper to electronic records. According to Tessier, coding in the PDF/H will enable data retrieval, something that neither current PDFs nor scanned documents allow.

The Near Term

While positive developments, such as the harmonization of the CDA and CCR standards and the emergence of PDF/H, will enable a higher degree of data and information exchange among providers and patients, the healthcare industry as a whole remains many years away from a true third-generation EMR as defined by Waagemann. Aside from what he perceives as a necessary shift in thinking about the medical record—from a collection of paper documents to a collection of databases—there are more nuts and bolts issues that need to be addressed, such as agreements on standards that govern terminology and other aspects of interoperability, not to mention the need for technology innovations to protect the privacy and confidentiality of personal health information and accomplish certain critical functions, such as electronic signature.

Waagemann identified other hurdles as well, including user acceptance/friendliness of the current EMR and related technology products; constantly changing technology; ever-increasing technology costs; changes within the healthcare professions and delivery systems themselves; and market uncertainty. "Who among the hundreds of vendors currently out there will be around 10 or 20 years from now?" asked Waagemann.

As he sees it, hospital EMR implementations will remain flat until the technology takes a significant leap forward. Meanwhile, Waagemann predicts the greatest growth in EMR use will occur in the ambulatory field, as physicians practicing in both small and large groups continue to implement EMRs in large numbers.

*AIIM, The Enterprise Content Management Association, and ASTM are collaborating to develop a best practices guide that will describe the PDF attributes that enable the capture, exchange, preservation, and protection of healthcare information. The guide will also describe how PDFs can be used to develop a secure electronic container to allow all relevant personal and family medical information to be included, such as chronic health histories, recent treatment notes, prescriptions, immunization records, allergy data, images (x-rays, computed tomography scans, magnetic resonance imaging, sonograms), graphics (lab values), potentially life-saving baseline electrocardiogram,

electroencephalography, and blood chemistry data, and other information for maintaining and improving someone's health.

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