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Designing and building an ambulatory Electronic Health Record

At the Boston-based CareGroup, the hospital EHR is being extended to physicians at 72 remote locations.

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The technology challenges associated with building, deploying and maintaining an Electronic Health Record application are complex. The EHR must support various types of information, including text, data, and images, often in different standards and formats. The information must be easily accessible to the appropriate people, yet patient privacy must be safeguarded.

The EHR system must be developed and deployed rapidly to ensure widespread adoption. In addition, this highly visible application must provide fast response-time and high reliability.

Hitting these targets means that selecting the right technology platform for the EHR application is a critical factor.

In mid-2003, CareGroup HealthCare System made the decision to deliver a patient EHR to ambulatory care providers in remote locations.

Headquartered in Boston, CareGroup is an integrated delivery network that includes Beth Israel Deaconess Medical Center (BIDMC), Mount Auburn Hospital, New England Baptist Hospital, Deaconess-Glover Hospital and Deaconess-Nashoba Hospital, as well as 72 ambulatory care practices.

CareGroup is considered one of the most technologically advanced hospital systems in the United States, and has been an early adopter of Electronic Patient Records. Our I.T. and clinical staff have worked closely over the past years to create a home-grown EHR system.

We knew that when extending the EHR to ambulatory clinics, Web accessibility was an obvious technology requirement. But a careful evaluation of database products was conducted before selecting the CACHÉ post-relational database from InterSystems Corp. as our database technology. The ability to support rapid application development and to deliver high performance and enterprise scalability made it the right choice for the EHR application.

From Concept to Rollout: A steering committee of 10 clinicians teamed up with a six-person IT group to transform the EHR application, which we named Web Online Medical Record (WebOMR), from an idea to a production system.

Working closely in an iterative development approach, the clinicians defined functional requirements, code was written and the results were reviewed and constantly improved via user feedback based on a series of user interface prototypes. Active clinician involvement was also the key to ensuring that the system would provide a lifetime, longitudinal view of Beth Israel Deaconess Medical Center (BIDMC) patient data, including medications, problems, allergies, visits, clinician notes, lab reports, radiology images, and physician orders.

Presenting that large volume of complex information in a highly useable interface was a major challenge that was met by the interactive prototyping design process.

We addressed the patient privacy issue by providing the patients themselves with access to a comprehensive audit trail, which stores a record over every lookup – who, what,

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where, when and why. In addition, all passwords expire every 120 days, providing another layer of security for sensitive information.

Rollout of the WebOMR application began in late summer 2004 with the final locations in the BIDMC network going live by December 2004. The remainder of the 72 ambulatory care practices associated with CareGroup will be accessing the WebOMR in 2005. It should also be noted that qualified referring physicians will have access to WebOMR patient information on a view-only basis in the same timeframe.

Delivering Quality Improvement and Cost Reduction: CareGroup is projecting significant care delivery benefits from the WebOMR implementation. The fact is that true EHRs inherently incorporate several features that enhance medication safety. Since medication error is responsible for an estimated 98,000 preventable deaths in the United States each year, according to the 2001 Institute of Medicine Report, Crossing the Quality Chasm, these capabilities are extremely important.

EHRs typically include individual patient information that makes it possible to ensure that the patient is receiving the appropriate medications to address active medical issues. Second, the EHR incorporates decision-support functionality to perform multiple quality and safety checks for appropriate dosing, drug/drug interaction testing, drug/allergy testing and therapeutic duplication checking, to ensure that patients are not taking multiple doses of similar medications.

Finally, EHRs enable care coordination among primary care providers and specialists, since everyone involved has a common view of a patient's entire healthcare experience. Based on experience at BIDMC and other Harvard-affiliated hospitals, medical error is reduced by 50 percent by use of EHRs in an ambulatory setting.

Cost savings projections from the WebOMR implementation are also positive. Since EHRs can include medical guidelines and protocols, the physician end-users typically adopt cost-effective best practices for diagnosis and therapy.

For example, it's known that use of preferred formulary medications can significantly reduce drug costs. At BIDMC, formulary management is keeping drug costs 10 percent below the national average.

And, once data is recorded electronically, it can be shared, ensuring that high-cost tests such as MRI and CT scans are available for all doctors, eliminating repetition of these tests at each institution a patient visits.

EHRs can provide much-needed alerts and reminders that enhance coordination of care and automate the process of ensuring that appropriate screening exams – Pap smears, mammograms and colonoscopies, for example – are performed in a timely fashion. Although the CACHÉ-based WebOMR application is still in the process of being rolled out to our ambulatory care network, it's evident that all of these benefits are already being realized. And with government, provider and payor support for a nationwide rollout of EHRs, 2005 is very likely to be a year in which the US makes significant progress on the road to building EHR systems nationwide.

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