On the Road to RHIOs

Boston-based IDN's database is the foundation of their enterprisewide EMR and CPOE and the cornerstone of their participation in regional and national clinical data exchanges.

By John Halamka, M.D.

In 2004, then Secretary of Health and Human Services Tommy Thompson established the Office of the National Coordinator for Information Technology to coordinate federal IT expenditures, encourage adoption of electronic health records (EHRs), create a national health information network (NHIN), and foster creation of local facilitators of clinical data exchange, regional health information networks (RHIOs).

At CareGroup Healthcare System, we have had many experiences with clinical data exchange among hospitals and communities. The CareGroup Healthcare System includes Beth Israel Deaconess Medical Center (BIDMC), Mount Auburn Hospital, New England Baptist Hospital, Beth Israel Needham Hospital, as well as numerous ambulatory clinical practices. Our journey to clinical data sharing began with results viewing, electronic health record rollouts and enhanced inpatient automation throughout our integrated delivery network. It then evolved to include communitywide RHIO activities.

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Clinical Data Viewing Among Clinicians

In many ways, CareGroup is a microcosm of the larger RHIO landscape. BIDMC has a comprehensive self-built clinical information system based on the Caché database from InterSystems Corp. Other CareGroup hospitals use the commercial MEDITECH system. Outpatient practices use both self-built and commercial products such as GE Centricity (formerly Logician).

To interconnect all the clinical data sources within our associated institutions, we first created a master patient index of our patient identifiers, which we stored centrally at the CareGroup data center. We left clinical data, however, in source systems and built Web-based peer-to-peer software called CareWeb which enables data exchange from existing systems via XML middleware. With this architecture, we avoided centralizing data in an aggregated database, which could lead to data integrity issues and security problems. In our view, the best way to avoid hackers is to keep the clinical records decentralized, making them available to clinicians with a need to know via real-time messaging.

CareWeb was rolled out in 1998 and provided clinicians with fast, easy-to-use, browser-based access to medical data, while also incorporating the robust security necessary to protect patient confidentiality. It was implemented in six months at a cost of $250,000. Today, it delivers savings of $1 million annually from reductions in clinician time spent searching for records, decreases in paper record storage costs and efficiencies gained in care delivery workflow.

Electronic Health Record Rollouts

CareWeb offered clinicians only read-only access to inpatient and ambulatory records. The next logical step was to offer read/write electronic health records for all owned/employed ambulatory practices. Not only do EHRs, which include order entry, e-prescribing and decision support, reduce costs and improve quality, but also they are a necessary prerequisite to communitywide clinical data exchange. CareGroup used Caché to create webOMR, a full-featured, Web-based EHR, and began rolling it out to ambulatory practices in late 2004. By the end of 2006, more than 75 percent of CareGroup's clinicians will use EHRs.

Art by Neil Brennan Illustrations.

The scope of this initiative has recently been expanded to include non-employed referring clinicians. To ensure that we comply with Stark restrictions and regulations requiring separation of practice data from hospital data, we will meet non-employed clinician needs via an ASP-hosted commercial practice management and electronic record system enhanced to include real-time results viewing of CareGroup data, as well as online ordering of laboratory and radiology tests from our facilities. As a result, we will be able to offer more than 1,000 physicians in Massachusetts the opportunity to purchase a hospital-hosted PMS/EHR at low cost.

Enhancing Inpatient Automation

In Massachusetts, our communitywide efforts to improve quality and safety also include broad rollout of computerized provider order entry (CPOE). BIDMC built a CPOE system in 2001 and deployed it across all hospital departments, virtually eliminating handwritten orders. Based on Caché, the Web-based system automates the entire process of ordering medications, tests and other interventions inside the hospital environment. Physicians order medications via a Web portal and the system provides input on appropriate drug options and cross checks for drug-drug interactions, patient allergies and duplicate drug orders.

The CPOE system has reduced dosing errors by 90 percent and overall errors by at least 50 percent, while eliminating redundant data entry and improving process flow. Our community hospitals also are rolling out CPOE and by 2007, all handwritten orders across CareGroup will be eliminated.

Our hospitals continue to automate inpatient records including progress notes, forms and medication administration records. Although we are among the most wired hospitals in the country, we are still only 50 percent digital. Our five-year goal is to achieve 85 percent electronic records. To do so, workflows that have been in place for years, such as paper-based patient consents, must be changed, and the workplace culture must undergo a transition to accept a fully automated environment. The benefits that are possible in terms of improved care delivery, however, make the transition a necessity rather than a choice.

Patient privacy is foundational to all our work and we ensure confidentiality best practices in all these systems by auditing information look-ups, transaction encryption, and automatically expiring passwords every 120 days.

Early RHIO Activities

Our Massachusetts RHIO activities have followed the same basic architecture as the early CareGroup

activities—a centralized master patient index facilitating peer-to-peer exchange of decentralized data among hospital systems and clinicians.

In 2004, Massachusetts (including CareGroup), Indiana and California worked together in a project facilitated by the Markle Foundation's Connecting for Health project to demonstrate clinical data sharing within and among RHIOs. We created regional master patient indexes, which we call the record locator service. Once a patient is identified, clinical data exchange components enable secure sharing of data using widely accepted content, structural and transmission standards.

Our 2005 proof of concept involved 500,000 patients and 20 million clinical records. No physician received a record for the wrong patient, and the effort demonstrated the practical feasibility of clinical data exchange among RHIOs. The next step will be to expand the functionality of our data exchanges in 2006 as part of Dr. David Brailer's NHIN contracts. CareGroup also has been involved with the Centers for Disease Control and Prevention's Biosense syndromic surveillance project in which our systems send patient deidentified population health data to the CDC every 15 minutes.

Creating Sustainability
RHIOs will only become sustainable if participating organizations are willing to provide ongoing or subscription or membership fees based on the value realized from clinical data exchange. Benefits quantification for clinical data exchange can present a major challenge. CareGroup currently estimates realizing $3 million to $4 million in pay-for-performance contracts in 2006 by implementing EHR and e-prescribing systems. With e-prescribing, for example, it is possible to retrieve a statewide-dispensed drug history and use it for drug/drug interaction checks.

It seems reasonable to assume that when data is shared among providers, the result is improved quality and medical error reduction. Massachusetts informatics experts estimate that 15 percent of the healthcare delivered in the state is redundant and wasteful. Our state can save approximately $4.5 billion a year by utilizing interoperable EHRs. CareGroup believes our systemwide data exchange efforts have significantly reduced errors and redundancy. One Massachusetts payer (Blue Cross Blue Shield) has invested $50 million in a project headed by the Massachusetts eHealth Collaborative to quantify the value of communitywide EHRs.

It remains difficult to measure the results of improved quality, value and efficiency that are the result of EHR and RHIO efforts. We can, however, highlight anecdotal examples. For example, within one hour of the announcement about the potentially dangerous side effects associated with Merck & Co. Inc.'s VIOXX, webOMR was enhanced so that clinicians could no longer prescribe VIOXX to any BIDMC patient. Within 24 hours, every patient who had been taking VIOXX was notified of the FDA action. Quantifying the impact of this fast response made possible by clinical computing systems is challenging, but the value of automating the elimination of a serious risk is obvious, and would not have been achievable with paper.

This year is pivotal in the history of RHIOs and data sharing. The goal is to harmonize standards, test architectures, inventory privacy rules across the United States and certify products. Based on our early experiences with clinical data sharing, we're optimistic that our country will be successful.

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