In his 2006 State of the Union address, President George W. Bush noted that, “We will make wider use of electronic records and other health information technology to help control costs and reduce dangerous medical errors.”

For the first time in U.S. history, government, academia, and industry are perfectly aligned to implement electronic health records (EHRs) on a nationwide basis.

Other countries are doing the same. The United Kingdom has allocated 6 billion pounds to build a network of EHRs across the country. Similarly, 85 percent of the clinicians in Sweden use an EHR.

There are three reasons why 2006 is the “perfect storm” for implementing EHRs. They are quality improvement, cost, and workflow. Also, a powerful secondary effect of EHR implementation is the empowerment of public health informatics initiatives, clinical research, and education.

Quality Improvement
The 2001 Institute of Medicine Report, Crossing the Quality Chasm, notes that medication error is responsible for 98,000 preventable deaths every year. EHRs incorporate several features that enhance medication safety.

First, they contain a comprehensive list of patient problems, medications, allergies, reports, and results. This enables a clinician to ensure the patient is receiving the appropriate medications to address the patient’s active medical issues.

Second, they incorporate decision support to perform several quality and safety checks to ensure 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. As a clinician writes an order for a new medication, the best practice dose for the patient is shown by default and checked for interactions against all other active medications. At Beth Israel Deaconess Medical Center, an affiliate of Harvard Medical School, clinicians accept 85 percent of doses suggested by electronic systems, ensuring rapid adoption of best practices for prescribing medications. As more evidence is incorporated from the literature for best prescribing practices, clinicians immediately change their prescribing behavior.

Third, EHRs ensure coordination of care because all primary caregivers and specialists can view a common record of patients’ entire healthcare experience, including inpatient, outpatient, and emergency care. This ensures that all prescribing is done in the context of the entirety of care for a patient, and not in isolation by a particular specialist trying to solve a particular problem.

The experience at Beth Israel Deaconess Medical Center and other...
Harvard hospitals is that the use of EHR systems in the ambulatory setting reduces medical errors by 50 percent.

**Cost Reduction**

Clinicians are often independent practitioners, each with their own view of the best practices for diagnosing and treating disease. Many clinical decisions are not evidence-based, and significant variation in medical care leads to redundant and often inappropriate testing and therapy.

That can be costly. For example, the state of Massachusetts spends approximately $30 billion on health care each year, and estimates suggest that 15 percent of that amount, or $4.5 billion, is spent annually on inappropriate or redundant care.

Because EHRs can incorporate guidelines and protocols, clinicians using these systems adopt cost-effective best practices for diagnosis and therapy. For example, the use of preferred formulary medications can significantly reduce drug costs. In the case of Beth Israel Deaconess, formulary management has kept drug costs 10 percent less than the national average.

A system recently developed by Beth Israel Deaconess in collaboration with Blue Cross/Blue Shield advises clinicians of the best radiology tests to perform for more than 1,000 clinical conditions. This system helps steer clinicians away from ordering unnecessary diagnostic tests, greatly reducing costs.

After data is recorded electronically, clinicians can share it, ensuring that expensive tests, such as MRI and CT scans, are available instantly for all clinicians, obviating the need to repeat them at each institution a patient visits, reducing the likelihood of redundant testing.

**Workflow**

Increasingly, clinicians are pressured to see more patients, making the task of tracking individual patient health and wellness issues more difficult. EHRs can provide the clinician with alerts and reminders that enhance the ability to coordinate care.

"EHRs also serve an important educational role for medical students, house staff, and attending clinicians. By using guidelines and protocols, clinicians in training learn best practices."

For example, abnormal lab values are escalated directly to primary caregivers, who ensure patients have prompt treatment, reducing morbidity and mortality. Reminders include sending notifications about patients who should be scheduled for screening exams, such as Pap smears, mammographies, and colonoscopies, and preventative interventions, such as flu shots. Early detection and prevention of disease are more efficient than retrospective treatment of advanced disease.

Some EHR systems incorporate features that enable patients to view their records, make appointments, and request medication renewal. Early experiences at Beth Israel Deaconess with sharing health records between clinicians and patients have resulted in significant increases in patient satisfaction; more efficient workflow for clinicians who can answer patient questions electronically via secure e-mail instead of phone calls; and improved practice process flow for appointment making and medication renewal.

EHRs also enhance workflow by fostering interaction among all office staff, ensuring clinicians are notified when patients arrive; ordered tests are executed by nurses and practice assistants; and billing is performed seamlessly. The end result is that clinician offices deliver a better patient experience.

**Public Health, Research, and Education**

EHRs are not only used for delivering care for individual patients but also have an important role in population health and research. Data gathered in electronic systems can be aggregated for population analysis to answer such questions as, “How many patients with diabetes have received an eye examination in the past year?”

These systems also serve the important role of gathering data for syndromic surveillance, enabling early detection of disease outbreaks and bioterrorism or chemical agent release. In Boston, an early warning system was created during the 2004 Democratic National Convention that sent all patient symptoms and diagnoses to public health agencies, along with geographic information about patient location to identify variations in disease patterns that indicated release of biological agents. Finally, EHRs are a legal necessity (21 CFR Part 11) for clinical trials and pharmaceutical research.

EHRs also serve an important educational role for medical students, house staff, and attending clinicians.
By using guidelines and protocols, clinicians in training learn best practices. By using decision support within the record, attending clinicians earn continuing medical education credits. Beth Israel Deaconess offers continuing medical education course credit based on the time that attending clinicians spend reading the evidence embedded in decision support systems.

**Massachusetts Data Sharing Initiatives**

After EHRs are in place, the data can be securely shared regionally and nationally to ensure patient care is coordinated, regardless of the site of care. Three projects in Massachusetts illustrate the power of sharing data across the state.

The New England Health Electronic Data Interchange Network was founded in 1997 to ensure that the basic information about patient insurance coverage, referrals to specialists, and claims for payment are exchanged collaboratively and electronically. In the past, such administrative information was exchanged via phone, fax, and paper. The cost of the old manual methods was $5 per transaction. With a community-wide electronic workflow, the cost per transaction for exchanging such information has dropped to 25 cents. The time required to perform these tasks went from hours to seconds.

The MA-Share initiative was established in 2003 to create community utilities for the exchange of clinical information such as medication lists. Meds-Info, one of the first projects of MA-Share, went live in 2004 and ensures that clinicians can view the medication lists of every patient in the state. Privacy projection is assured through the use of audit trails and sanctions—clinicians who violate privacy rules are subject to fines and penalties.

The Massachusetts eHealth Collaborative was established in 2004 with a $50 million grant from Blue Cross/Blue Shield, the largest insurance company in Massachusetts, to fund the implementation of EHRs in three pilot Massachusetts communities. After these systems are in place, clinicians will be able to share data between the cities using the community data exchange utilities built by MA-Share. If the pilot succeeds in improving quality and reducing cost, then other insurance companies in Massachusetts will contribute the $1 billion needed to implement EHRs for every clinician in the state.

**Summary**

EHRs and data sharing improve quality, reduce costs, and enhance workflow. They create a community of clinical collaboration, fostering the adoption of new knowledge and best practices. With government, provider, and payer support for the nationwide rollout of electronic records, 2006 will be the year in which the United States makes significant progress on the journey to deliver electronic systems to all clinicians.

**About the Author**

John Halamka, MD, is the CIO of Harvard Medical School, CIO of Beth Israel Deaconess Medical Center, and an early adopter of RFID, including having a passive chip implanted in his triceps. He has no association with any company that provides the technologies discussed in this article.
We are pleased to sponsor this edition of the *Journal of Healthcare Information Management (JHIM)*, which has always been one of my favorite publications. This issue’s focus, *Integration and Interoperability*, is certainly not a new industry theme, but it’s especially critical today as we face new obstacles to achieving it as well as new opportunities for success.

It’s a theme that resonates with me. From our inception in 1992, DINMAR’s vision has been rooted in a deep understanding of the challenges facing healthcare – and of the information technology (IT) needed to help overcome those challenges. We cut our teeth helping care delivery organizations (CDOs) effectively use IT to address healthcare challenges, not with expensive pie-in-the-sky approaches, but with “sensible healthcare IT.” And what could be more sensible than leveraging existing investments by connecting systems that are already functioning well?

We believe our hallmark Oacis system – which helped launch the HL7 interoperability movement over a decade ago – is a good example of how this gets done. The philosophy behind it is simple: connect disparate systems through open-architecture technologies and applications, integrate patient information into a flexible clinical data repository, and provide clinicians with robust functionality to create clinical value from that information. This approach results in unparalleled “speed to value” for CDOs seeking to use IT to improve care quality while reducing operating costs.

This issue of *JHIM* provides a broad range of provocative and practical ideas that underscore how CDOs can achieve this vision. As such, it’s a true glimpse into healthcare’s future.

Enjoy.

**Mark Groper**
President & CEO
DINMAR

“HIMSS gratefully acknowledges DINMAR, a healthcare IT solutions company and producer of the Oacis system, for sponsoring this issue’s Special Focus Section on Integration and Interoperability.”