

Electronic Health Information: The Key to Evidence-Based Medicine and Improved Patient Care

WHITE PAPER

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GOVERNMENT INSIGHTS OPINION

The healthcare industry in the United States suffers the distinction of being recognized for providing less-than-optimal service at a very high cost. U.S. healthcare costs per capita are among the highest in the world¹, but various studies conclude that a significant portion of the healthcare provided is redundant or ineffective.

One of the most significant obstacles to improved patient care, at a reasonable cost, is the relative lack of access to current, comprehensive patient medical information — for patients, healthcare providers, and healthcare benefit payers. To increase the quality of U.S. healthcare, this information must be captured, updated, and shared with all stakeholders in a timely and effective manner to ensure universal access to quality data.

While some small-scale efforts to capture and leverage this information are under way, the industry should be encouraged to better utilize information technology (IT) in both the near term and the long term. Government could facilitate this greater adoption of technology by taking a number of alternatives into consideration:

- Work with industry to develop standards for medical records, including content, terminology, interoperability, and code sets
- Identify higher-cost areas and prioritize IT investments in those that show the most regional variation in cost per patient and medical outcome
- Consider developing and implementing financial incentives that reduce the cost burden of collecting and maintaining healthcare information
- Examine the regulatory environment in the U.S. healthcare industry to determine which legislative or policy actions promote more effective use of information technology

IN THIS WHITE PAPER

This Government Insights White Paper provides background information on the healthcare industry in the United States and the challenges and opportunities associated with leveraging technology and electronic health information to promote more effective care delivery across a broader patient community. This paper also highlights two case studies that demonstrate how technology can serve as a key component of effective healthcare by creating the data framework for evidence-based medicine (EBM).

The theory behind EBM is one in which there is an open environment that provides systematic analysis of all available evidence in electronic format from an ever-changing, continually updating statistical set. Data sets may include standard clinical trial models, publications on medical protocols and their efficacy, demographic and genetic data, and day-to-day in-field observations. This would allow physicians to balance their experience and training with EBM data, which could provide real-time situational awareness and decision support.

There are, however, two substantial hurdles to realizing this vision. First, there is no vast data set that can be searched in real time and filtered using domain-specific medical protocol intelligence (with implied semantic mapping of terminology), and second, physicians and healthcare administrators are not currently prepared to easily adapt to this new decision-making paradigm. Yet, despite these hurdles, EBM is gaining traction for two major reasons: its promise as a tool to help contain continually rising healthcare costs and its potential to significantly improve healthcare quality.

SITUATION OVERVIEW

The healthcare industry in the United States is not operating at a level of quality or efficiency desired by patients, healthcare professionals, or industry watchdogs. Several significant concerns exist related to quality of patient care, prevalence of incorrect medical diagnosis or medical treatment, and constantly rising costs.

Current Industry Environment

A Health Industry Insights report published in April 2007 cited a number of recent studies that identify significant issues in the U.S. healthcare industry:

- In 2004, HealthGrades (a healthcare ratings organization) reported that an average of 195,000 people in the United States died annually from 2000 through 2002 due to potentially preventable, in-hospital medical errors.

- Approximately \$300 billion per year — or about 30% of the total annual U.S. expenditure on healthcare — is spent on ineffective or redundant care. (Wennberg/Fisher, 2002–2004)
- Healthcare premiums have risen about 84% since the year 2000. (joint study from Kaiser Family Foundation and Health Research and Educational Trust)
- The United States spends more money per capita on healthcare than any other country; in 2004, per-capita expenditures were \$6,280. (Centers for Medicare & Medicaid Services)

In 2004, President George Bush set a goal of universal EMRs by 2014, outlining a detailed plan designed to increase IT use in healthcare and to create national standards that would enable medical information to be digitized, stored, and shared electronically. Progress toward this goal has been slow and sporadic. At the same time, the U.S. Government Accountability Office (GAO) estimates that the percentage of GDP spent on healthcare in the United States will go from 16% to 20% by 2015.

Despite all of the expenditures on healthcare described earlier, the United States scored only 66 out of a possible 100 in a 2006 Commonwealth Fund report that measured 37 key indicators for quality, based on national average performance against top performance benchmarks. The report called for better handling of patient records to improve patient safety, quality of care, and healthcare provider productivity. If better handling of records is to be achieved, significant effort needs to be spent on leveraging technology and strengthening the collection, maintenance, and utilization of electronic health information.

An example of rising healthcare cost directly tied to a lack of data is that of healthcare-associated infections (HAIs), which are infections contracted by patients through exposure to bacteria-contaminated hospital devices and accommodations. According to a March 2008 GAO report, the Centers for Disease Control (CDC) reports that 10% of all hospital deaths are a result of HAIs.ⁱⁱ The same GAO report goes on to state that "multiple Department of Health and Human Services programs collect data on HAIs, but limitations in the scope of information they collect and a lack of integration across the databases maintained by these separate programs constrain the utility of the data." A majority (approximately 66%) of these cases affect elderly patients who rely on Medicare, for which the long-term prognosis is rapid and substantial cost increases.ⁱⁱⁱ

CHALLENGES

As presented in the Situation Overview, the U.S. healthcare industry is currently performing significantly below an optimal level. While better leveraging and utilizing electronic health information can help the industry improve its performance, key challenges must be addressed in order for such improvements to occur. Some of the prevalent challenges are presented in this section.

Resistance to Cultural Change

A recent report by the Congressional Budget Office noted that per-capita annual spending in 2004 on healthcare by state ranged from under \$4,000 to over \$8,000 without any significant correlation to positive healthcare outcomes.^{iv} Where ambiguity or multiple options for treatment exist, local and regional physician cultural norms tend to dictate variations to specific elements of a medical protocol delivered (e.g., lab test ordered, imaging exams performed). Fear of malpractice ensures adherence to these norms (i.e., a physician follows the same protocol as all other physicians to reduce liability).

Lack of Consistent Standards

Currently, deployments of fully functional electronic health records, which cross practice and provider boundaries, are rare. A major reason is the variety of different electronic health records in current use. Another significant factor is the lack of consistent standards across health records in a number of pertinent areas (e.g., content, terminology, clinical relevancy, interoperability, code sets, and clinical practice). Until a set of base standards can be developed and implemented across the set of health records in current use, healthcare information will continue to exist in stovepiped data sets that cannot be accessed and used across a broad range of healthcare stakeholders.

Implementation Costs

Costs to acquire and implement electronic healthcare information systems are significant, and most of the technology solutions currently available are not mature due to the lack of standards described earlier and other factors. Cumbersome workflows and ongoing maintenance costs are other barriers to acceptance.

Misaligned cost burdens also impede implementing electronic health information in the current environment. For EHRs to be fully functional, EMRs and clinical information systems (such as computerized provider order entry [CPOE] systems) must already be in place. However, a 2005 study by the Medical Group Management Association showed that less than 10% of physician practices surveyed had a fully implemented EMR. One reason is that while the cost of the

EMR system is fully borne by the healthcare provider, the healthcare payer actually recognizes many of the benefits of the EMR system. As an example, the Center for Information Technology Leadership reported that physicians realized a mere 11% of the savings associated with implementing an ambulatory CPOE system, while the other 89% of the savings was realized by private sector and government payer organizations.

In addition to these monetary costs, physician productivity is impacted in the short term as new systems and new processes are put in place, and some estimates put the drop in productivity at around 20%. While the hope is that these costs are recovered in the long term, the short-term impact should not be ignored and may serve as a barrier to physician/practice acquisition of these systems.

OPPORTUNITIES FOR TRANSFORMATION

Earlier sections have described some of the current issues and challenges in the U.S. healthcare industry. In this section, we discuss some of the potential opportunities for transformation that exist if the industry can leverage information technology to a greater extent.

Shift in Physician Demographics

A portion of the resistance to electronic health information systems can be credited to a generation gap. Many physicians in practice today began their careers before the current advances in information technology were available; thus, they are accustomed to providing patient care without incorporating electronic information in a significant manner. However, current (and all future) generations of physicians have grown up in a fully "connected" society. These generations have grown accustomed to the benefits provided by technology and will be open to leveraging technology to better serve their patients and manage their business. As they begin to embrace electronic healthcare records that begin to inform EBM, many of the entrenched justifications for variations in medical protocols are likely to break down.

Better Access to Information for All Stakeholders

Acquiring and implementing secure and effective information technology that spans the patient, ambulatory care, clinic, provider, policymaker, and payer communities should lead to improved quality of care through a more comprehensive decision process and better-informed decision making at all stakeholder levels. Physicians can perform diagnoses based on more comprehensive background healthcare data their patients have received from multiple providers and payer organizations — both public and private — to more

effectively assess the prescribed care pathways for relevancy. Healthcare public policymakers can implement more effective healthcare delivery and payment policies informed by more detailed and statistically accurate demographic information. Patients have greater access to their personal health records, which can assist them in making better, more informed healthcare decisions.

This information presents the opportunity to create the EBM scenario by integrating individual care delivery across vast and specific demographic sets to more accurately and holistically address scenarios. A person with a given illness in a specific region of the country can be compared against a series of healthcare providers and payers and a list of medical protocols and procedures used to diagnose and treat that illness. An EMB scenario could also provide information such as the payment period and a list of average costs that a patient and/or payer could expect to pay for treatment.

Evidence-Based Medicine Can Drive Improved Patient Safety and Quality of Healthcare Provision

In the current environment, industry estimates indicate that paper-based medical records in hospitals are unavailable approximately one-third of the time they're needed, and about 18% of medical errors are attributed to inadequate patient information. When properly developed and implemented, information technology — and electronic health information systems — would dramatically decrease instances of patient records being unavailable and would also eliminate or significantly reduce the occurrence of medical errors that result from inadequate information.

If physicians can access comprehensive, current medical information for their patients in a timely manner — including past medical history and treatment information, relevant physical conditions, test results, and so on — they can conduct evidence-based medicine that should reduce medical errors and faulty diagnoses. This would result in better patient care, improved patient safety, and a reduction in redundant tests and/or treatment. Additional benefits could include faster, more concentrated diagnoses (based on the availability of comprehensive patient information), which could result in more effective treatment protocols and a higher rate of patient recovery or cure.

In addition, leveraging technology could enable advanced clinical decision support and alerts. For example, alerts could include messages that advise physicians when prescribed medicines might cause an adverse event due to potential drug/drug interaction, drug/food interaction, or patient allergy. However, a balance would be needed in terms of alert frequency, as excessive alerts might tend to frustrate physicians and inhibit adoption/use of technology.

Reduced Overall Cost of Care

If properly populated and leveraged, electronic healthcare information should reduce the overall cost of healthcare by reducing or eliminating redundant tests and/or treatment, reduce or eliminate medical errors that result from unavailable or incomplete patient information, and allow physicians to make better and more relevant care decisions in a timely manner.

In addition, leveraging information technology and current, accurate electronic health information could reduce or eliminate a portion of Medicare and Medicaid expenses, since a portion of these treatments (and their associated costs) are redundant or ineffective due to the treatments being prescribed based on inaccurate or incomplete information in the paper patient record. In recent congressional hearings on healthcare cost containment, IT has consistently been cited as a major part of any successful reform.

Finally, when all parties involved have access to current, accurate health information in a timely fashion, the incidence of fraudulent treatment by providers and claims disputes by providers, payers, and patients over treatment billing and reimbursement justification should be significantly reduced. In the current environment, identifying and addressing potentially fraudulent treatment and claims is very difficult, so there is significant potential for fraud and abuse of the system because information is siloed and justified within that vacuum. If healthcare providers, healthcare payers, and patients and their families all had access to relevant patient information and treatment history and demographics regarding average incurred expenses and specific protocols used, the potential for fraud and discrepancies in payments and reimbursements for legitimate treatment would be substantially reduced.

How Do We Get There?

For the healthcare industry to fully realize the benefits that electronic health information can provide, several process steps need to occur in a sequential manner. For example, implementing clinical information systems is a prerequisite to an EMR, and an EMR is a prerequisite to an EHR; therefore, the standardization of data collection and maintenance efforts must begin at the clinical level and grow from there. To do this effectively, the healthcare industry needs a controlled medical vocabulary that standardizes clinical terms to process and analyze clinical data. Semantic transformations of information within records at the time of query and extraction from disparate medical records would need to be undertaken.

Connecting healthcare information for a single patient from multiple healthcare clinicians, providers, and payers requires a master patient index at the enterprise level. The master patient index would connect

identifiers that healthcare organizations have on record (e.g., medical record number, health plan ID or patient ID number, social security number) with patient demographic data such as name, birth date, gender, and address. The master patient index would be a critical component in ensuring that all healthcare encounters are linked to the correct patient. Representative efforts in support of such an index are under way in the form of the U.S. National Patient ID and Provider ID programs.

In order for healthcare information systems to be embraced across the healthcare industry, the systems must ensure the security and privacy of patient information. Clinical data should be available to those with the appropriate permissions, but *only* to those with the appropriate permissions. The Health Insurance Portability and Accountability Act (HIPAA) provides strict regulations concerning access to medical information, and full compliance with HIPAA requirements is a key component of any healthcare information system.

While overcoming all of the challenges and obstacles described earlier may appear to be an insurmountable task, the potential benefits are well worth the effort. The following case studies demonstrate some of the benefits already being recognized by healthcare information systems.

CASE STUDIES

U.S. Department of Veterans Affairs, Veterans Health Administration — My HealtheVet Portal

In addition to the general healthcare industry challenges described earlier, the Veterans Health Administration (VHA) faces other hurdles in providing quality healthcare to U.S. veterans. The majority of the VHA's patients are over 65, in less than good health, and typically not affluent. Historically, no means existed for VHA caregivers to rapidly receive broadcast announcements regarding changes in medications, treatments, diagnoses, or other information for veteran-specific illnesses such as Gulf War syndrome or Agent Orange. Since the traditional records process was paper based, documenting and processing any health event could take weeks.

A long-time U.S. trendsetter in terms of integrating information technology into the healthcare system, the Department of Veterans Affairs (VA) has grown from an organization of 48 hospitals and 30,000 employees into the nation's second-largest federal agency. Today, approximately 237,000 VA professionals provide healthcare to more than 5 million veterans through 157 hospitals and more than 850 community clinics, and pensions and disability compensation are paid to over 3.4 million veterans through regional VA offices.

In response to these unique challenges, as well as a 2001 survey that showed 62% of veterans use the Internet, the VHA set out to develop a patient-centric health information system that could be accessed by the veteran, the veteran's caregivers, or anyone the veteran deemed appropriate through a secure portal, from any public Internet connection.

The task facing VHA was to develop a secure portal that could: 1) provide the veteran with full control over who had access to the veteran's health records, 2) enable role-based and user-based access (as defined by the veteran) to be available both inside and outside the VA network, 3) create a system that doctors felt would provide them with faster and more comprehensive access to patient information at a realistic investment level, and 4) handle all logistical items including appointment scheduling, prescription ordering, and tracking and provide a consolidated repository of health information to support decisions related to particular aspects of the veteran's health.

All of these challenges had to be addressed with the expectation that the vast majority of the systems that would hold or originate the veteran's medical profile and data would be siloed and distributed across military hospital record systems (prior active duty records), private records from pre- and postmilitary service, and the VA records.

My HealtheVet portal, launched on Veterans Day, November 11, 2003, is a secure portal that provides the gateway to veteran health benefits and services. It provides access to trusted health information, links to federal and VA benefits and resources, the Personal Health Journal, and online VA prescription refill. Electronic refill of prescriptions is the number 1 requested service by veterans, and 2.5 million prescriptions have been refilled through the My HealtheVet portal. In the future, registrants will be able to view appointments, copay balances, key in portions of their medical records online, and much more.

Since My HealtheVet portal has requirements to scale to a broad and diverse population, the technology solution needed to scale must also be adopted accordingly. From a technology perspective, My HealtheVet portal leverages Oracle's WebLogic Portal and a service-oriented architecture (SOA) infrastructure for integration to back-end systems and healthcare data repositories. The portal and service infrastructure supports over 377,000 registered veterans and has supported over 9 million user visits since August 2005.

My HealtheVet portal is a powerful tool that enables veterans to better understand and manage their personal healthcare and helps VA healthcare providers to make decisions based on accurate, current, and comprehensive patient information. President Bush has pointed to My HealtheVet portal as a model for what needs to occur in the private sector.

**Centers for Medicare & Medicaid Services
— Physician Quality Reporting Initiative
Platform**

On December 20, 2006, President Bush signed the Tax Relief and Health Care Act of 2006 (TRHCA), which authorized the Centers for Medicare & Medicaid Services (CMS) to establish and implement a physician quality reporting system. In response to the mandate, CMS created the Physician Quality Reporting Initiative (PQRI).

The PQRI provides a financial incentive to participate in a voluntary quality reporting program. Eligible healthcare professionals who successfully report a designated set of quality measures on claims may earn a bonus payment, subject to a cap, of 1.5% of total allowed charges for covered Medicare physician fee schedule services. The goal was to promote and support evidence-based medicine, increase the overall quality of care provided under Medicare, and transform the Medicare program from a passive payer to an active purchaser that rewarded professionals for quality healthcare provision and effective outcomes.

To compel physicians and healthcare providers to participate in the voluntary reporting program, CMS needed to develop an automated system that was easy for the participants to access and use, secure to ensure the protection of private healthcare information from inappropriate access, and able to sort through submitted information and generate reports that would allow CMS to assess the submitted claims and identify those claims that qualified for the bonus payment.

Called QualityNet, the CMS PQRI system uses Oracle's WebCenter Interaction portal and Oracle's WebLogic Application Server to collect the submitted claims from participating healthcare providers, perform analysis to determine if claims meet the established quality criteria, and issue bonus payments to qualifying participants. Although the system is in its infancy, CMS announced more than \$36 million in bonus payments to many of the more than 56,700 health professionals who satisfactorily reported quality information to Medicare under the 2007 PQRI. The average incentive amount for individual professionals is more than \$600, and the average incentive payment for a physician group practice is more than \$4,700, with the largest payment to a physician group practice totaling more than \$205,700.

As participation in PQRI grows over time, the overall quality of care provided to Medicare patients should increase due to PQRI's emphasis on evidence-based medicine, and qualifying healthcare providers will earn higher pay for quality performance.

CONCLUSION

In combination, EBM and SOA-based information technology offer great potential to the healthcare industry as a means to reduce healthcare costs and increase the overall quality of healthcare provision by providing access to current, comprehensive healthcare information to both patients and healthcare providers and public and private health benefit payers. Neither idea is new, and both have seen proponents and detractors, real hype, and some proven successes independently. While there are potential pitfalls, we believe providers can leverage technology based on SOA methodologies to perform EBM that can lead to fewer medical errors, redundant procedures, and faulty diagnoses through improved provider access to comprehensive patient information. The same combination of EBM and SOA can enable patients to leverage online healthcare information and build tighter relationships with their personal healthcare providers to become more informed as to personal healthcare choices and to get more involved in their own healthcare decisions.

For the healthcare industry to realize the full potential of EBM and SOA, several steps must be taken to standardize medical terminology and facilitate information sharing across different segments of the healthcare industry. While none of these steps are insignificant, the potential benefits substantially outweigh the short-term implementation costs.

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ⁱ *World Health Statistics 2008: Global Health Indicators*. World Health Organization, 2008

ⁱⁱ U.S. Government Accountability Office, *Health-Care-Associated Infections in Hospitals*, March 2008

ⁱⁱⁱ Congressional Budget Office, *The Long-Term Outlook for Health Care Spending*, November 2007

^{iv} Peter R. Orszag, Director, Congressional Budget Office, "Opportunities to Increase Efficiency in Health Care," Statement at the Health Reform Summit of the Committee on Finance, United States Senate, June 16, 2008