WIRED FOR QUALITY: The Intersection of Health IT and Healthcare Quality

EXECUTIVE SUMMARY

It is generally recognized that health information technology (IT)—featuring but not limited to electronic health record (EHR) systems—holds great promise for facilitating the collection and analysis of quality data and thus appreciably improving the quality of American healthcare. However, the implementation of an EHR system that is usable across institutions, care settings, and distances is a complex endeavor. Such a system should be adaptable for a variety of user needs and also support clinical processes simultaneously. It requires standardization of terms and technical specifications, the cooperation and collaboration of multiple disparate parties, and a significant financial investment that may not be recouped by the users—in strict dollar terms—for many years. More specifically, if EHRs are to support quality measurement and improvement and public reporting on performance, they must capture the necessary patient, clinical, and other data needed to assess performance, and the performance measures must be specified using common conventions and standardized data elements. This Issue Brief explores how health IT can improve the quality of healthcare; the benefits of EHRs to clinical practitioners (e.g., clinical decision support); and the importance of ensuring that quality improvement and health IT adoption go hand-in-hand. It also identifies the major "players" in the health IT arena and the next steps that need to be taken. Finally, this Issue Brief envisions the goal of a unified health system in which performance data are collected and acted upon in real time.

Introduction

Healthcare today is blazing two major pathways, both of which promise great benefits.

The first is the quality movement. Ever since the Institute of Medicine reported that up to 98,000 Americans die each year as the result of medical error[1] and that the quality of healthcare in the United States is substantially lacking in many pivotal areas,[2] there has been renewed focus and vigor in applying the principles of performance measurement and accountability to the delivery of healthcare.

As a result, there has been great progress in measuring and improving quality, much of it in the last five to seven years. Modest but consistent improvement in a variety of measures and indicators has been documented. Today, nearly every hospital in the United States publicly reports data on a set of National Quality Forum (NQF)-endorsed™ performance measures. Measuring performance in ambulatory settings is more limited, but the NQF portfolio now includes a sizable number of measures, and growth is expected in public reporting and pay-for-performance programs for clinicians, medical groups, and ambulatory practice settings.

The second development is a rapidly growing health information technology (IT) sector. Health IT manifests in functions large and small in many clinical care settings, in such applications as computerized prescriber order entry, digital radiography, and, perhaps most importantly, electronic health record (EHR) systems.

IT innovations may not immediately strike the casual observer as being as impressive as those in clinical technology— such as early detection and treatment of certain cancers—but over the long run, these innovations likely will be far more significant. Health IT advances collectively offer the promise of getting complete clinical information to caregivers instantaneously along with clinical decision support (i.e., prompts, which are reminders to a clinician to ask a question or supply a drug, and alerts, which are alarms telling the clinician that something in the clinical encounter may be amiss, such as a drug being prescribed that is contraindicated given current medications). EHR systems thereby offer the possibility of informing the decisionmaking process at the point of care and thus improving the quality of healthcare delivered.

However, these two developments— the quality improvement movement and the maturation of IT—exist largely independently of each other, with some experts specializing in quality and others in IT, but rarely in both. Healthcare providers' quality budgets tend to be small, their IT budgets only slightly larger, and, significantly, they are administered separately. This situation hampers both developments. "If we're going to spend all this intellectual capital, all this financial capital, and the political capital that goes along with it, to create an IT-enabled health system, we should take the time now to make sure it will work for quality," says Paul C. Tang, MD, MS, Vice President and Chief Medical Information Officer of the Palo Alto Medical Foundation and Chair of the NQF Health Information Technology Expert Panel.
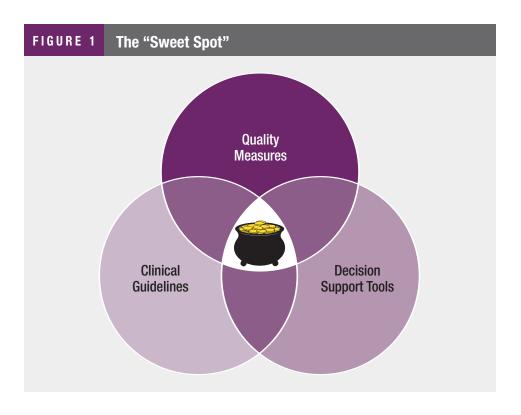
Today, the collection of performance data is a cumbersome and expensive process. Although some measures can be derived from administrative data, many others rely on data extracted manually from reviewing medical charts or captured through special data collection instruments. Performance information is not available until weeks or months after the clinical encounter. This process places great burden on the healthcare provider and usually limits quality improvement and reporting activities.

Ideally, IT should enable quality improvement by capturing performance data as a byproduct of the care process. Done correctly, EHR systems will seamlessly track and report *immediately* on performance, allowing both for real-time or nearly real-time reporting and helping clinicians prevent mistakes *before* they occur. "Wouldn't it be wonderful if the same data collected during the care process could be used automatically to trigger clinical decision support reminders and later aggregated and de-identified to appear in quality-measurement reports? That would be the ultimate in capture-once-reuse-many-times kind of efficiency that would make quality measurement and quality improvement an affordable byproduct of care," says Dr. Tang.

The quality dataset needed to support most of performance measurement for public reporting for the most part consists of the same data needed to build clinical decision support (i.e., prompts and alerts) into EHRs. Every EHR should be capable of capturing this quality dataset, sometimes referred to as the "sweet spot." (See Figure 1: The "pot of gold" in the center of the diagram represents the quality dataset.)

In other words, EHRs and quality should go hand-in-hand. Building EHRs to support quality measurement and improvement will not only bolster quality efforts, it will greatly enhance the IT value proposition.

This vision of a smart performance measurement, reporting, and clinical decision system is achievable, but it requires the standardization of terms and technical specifications for the quality dataset. It also requires the collaboration and cooperation of the quality community and the EHR community to develop standardized terminology and technical specifications for the quality dataset, which should be updated frequently to reflect changes in the content or specifications of performance measures in the NQF portfolio.

FIGURE 1 — The "Sweet Spot"

Today, many organizations are working together to define a common language and achieve common goals. With strong leadership and continued public and private sector investments in both health IT and quality, the pieces may be falling in place to support a series of major steps forward in achieving both developments.

Vision and Rationale: Applying The Best Available Knowledge to Every Patient, Every Time

Healthcare depends on good information— about variables such as clinical conditions, the patient's and his or her family's health history, patient behaviors, and the treatment plan. Unfortunately, the total knowledge of what is known about any patient during a given clinical encounter is dwarfed by what is not known. Countless numbers of patients are harmed as a direct result of this knowledge gap. The ultimate goal of a technology-enabled interoperable health record system is to bridge this gap in order to bring critical information to the health professional and the patient at the point of care. (See Box 1 for a short glossary of health IT terms.)

Healthcare also depends on scientific knowledge, the base of which is expanding at a rate unprecedented in human history. Every day, new advances are made in surgical and pharmaceutical interventions and diagnostic innovations and groundbreaking research such as genomics. Put simply, we know more than we ever did, but the challenge of transferring that vast amount of new knowledge to the clinical bedside is formidable. Although healthcare can do more than ever, it is so much more complicated that the risk of error with even the simplest of healthcare encounters is high.

IT provides a potential solution. IT-enabled tools—long used in other industries to facilitate everything from banking transactions to aviation—hold great promise for managing and moving data that are critical to the successful practice of medicine.

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<tr><td>B O X 1</td><td>Glossary</td></tr>
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Clinical decision support: An interactive computer program that assists physicians and other health professionals with decisionmaking tasks through prompts and alerts.

Electronic health record (EHR): An individual's medical record in digitized format.

EHR system: An EHR system includes the longitudinal collection of electronic health information for and about persons, where health information is defined as information pertaining to the health of an individual or healthcare provided to an individual; immediate electronic access to person- and population-level information by authorized, and only authorized, users; provision of knowledge and decision support that enhance the quality, safety, and efficiency of patient care; and support of efficient processes for healthcare delivery. Critical building blocks of an EHR system are the EHRs maintained by providers and personal health records maintained by individuals.[5]

Health information exchange: The mobilization of healthcare information electronically across organizations within a region or community.

National Health Information Network: The portion of the national health IT agenda intended to provide a secure, nationwide, interoperable health information infrastructure that will connect providers, consumers, and others involved in supporting health and healthcare.

Personal health records: An electronic health record that is accessible and controlled by the individual, composed of data from multiple sources.

Quality dataset: The data needed to support most performance measurement for public reporting.

RHIO: Regional Health Information Organization, a multistakeholder organization formed by healthcare stakeholders to facilitate the sharing of personal health information.

The IT development that is most promising in healthcare is the EHR. At its most basic, an EHR is the patient's medical record in digitized format. EHR systems coordinate the storage and retrieval of an individual's records with the aid of computers. EHRs are usually accessed on a computer, often over a network.

It is envisioned that EHRs will facilitate the collection and dissemination of more precise and more relevant information and will deliver that information faster, at the same time increasing clinicians' effectiveness and improving quality. EHRs should help both clinicians and patients make good decisions by providing them with prompts and alerts.

This would lead to higher-quality care; in fact, evidence exists that EHRs directly contribute to improved quality.[3,4] Specifically, EHRs enable enhanced quality measurement and reporting, improve decisionmaking by thwarting potentially dangerous care, and support the clinician at the point of care—a benefit known as clinical decision support.

Where We Are Versus Where We Need to Be
Although healthcare quality measurement has made great strides in the United States in recent years, it remains in many ways a rudimentary exercise.

Today, by and large, performance data are collected from paper records, captured on claims data, or collected using special data collection tools. This process imposes a significant resource burden on the clinical provider and in many instances fails to accurately or completely reflect what actually occurred during care. It has led to a system in which—the efforts of many in the healthcare quality measurement community notwithstanding—we measure what is easily measurable, not necessarily what matters most to any stakeholder.

Contrast this with a vision of an interoperable health information network. Such a network would include EHRs with clinical decision support—giving clinicians the ability and support to do the right thing at the point of care—and simultaneous data capture for quality measurement improvement and reporting.

The Path Ahead: Current Challenges

We have witnessed major breakthroughs in the diagnosis and treatment of countless diseases and conditions in recent decades. These include sophisticated diagnostic tools and laboratory tests, minimally invasive surgery, and advanced pharmaceutical treatments. These developments have transformed the practice of medicine, and patients who have benefited from these innovations have every right to consider them miracles.

That said, the IT challenge may be the most formidable one healthcare has ever faced. Consider the following:

- the thousands, if not tens of thousands, of data points that comprise modern healthcare, including clinical, administrative, and payer data;
- the need for interoperability across settings of care;
- the multiple stakeholders who will need to access an EHR system for many disparate uses; and
- the balance of security and ease of access that must be struck.

Finally, consider the expense: The implementation of interoperable EHRs throughout the United States will likely cost hundreds of billions of dollars, but funding sources are uncertain. Although the return on investment from a patient and societal point of view is clearer, the rate of return is far less obvious for the providers who must make the financial investments.[6]

Challenges

Moving to an IT-enabled interoperable health system will not be easy. It is a time-consuming and expensive process, and it is complicated. Although it is not insurmountable, several barriers need to be overcome.

First, there is the challenge of **defining what should be contained in an interoperable health record system and its capabilities.** This requires more than simply stating in broad terms what elements an EHR should have; it requires the precise definition of data elements, data fields, and terms. Simply put, an EHR needs to measure the same concepts and speak the same language in order to consistently and reliably measure quality. Although there is no dearth of health IT standards, such standards do not exist when defining quality metrics (e.g., the definition of diabetes may be interpreted differently by different institutions). This lack of a set of precisely defined, universally adopted clinical definitions is an obstacle to measuring and comparing quality. There has been progress in recent years with strong federal leadership and national collaborative initiatives, but this effort is still nascent.

The second barrier is **cost**. The undertaking is not fully funded; in fact, broad agreement is lacking about who should bear responsibility for funding. Lack of adequate funding has been cited by providers as the most significant barrier to adopting EHRs.[7] Steady progress is evident, particularly by larger hospitals and systems, academic medical centers, and multispecialty groups, but EHR implementation is lagging for smaller hospitals and small group practices that lack organizational infrastructure and access to capital.[8]

Finally, even if the endeavor were fully funded, it is **time and labor intensive.** It requires diligence to evaluate and implement hardware and software systems, redesign care processes, and train physicians and other clinicians to use them. Managing a transition to an EHR is not simply a matter of technological implementation; it requires a cultural transformation. Expertise in health informatics, a multidisciplinary profession, is required for successful management and implementation of this complex project. Software and installation costs, while significant, are dwarfed by training and maintenance outlays; if a provider fails to make the requisite process and culture shifts, money spent on health IT may be wasted.

Achieving the vision of an interoperable health record system is likely to be a difficult process. The following conditions must be met if the effort is to succeed:

- **Health systems must focus on overall system objectives.** Hospitals and other institutional providers of healthcare face the challenge of moving multiple

clinical and record-keeping systems, not just one, to a digitized format. These systems—including laboratory, imaging, order entry, and pharmacy—vary within each institution regarding their adoption of electronic means of communication. Many were installed in order to achieve quick wins—that is, they were relatively low-cost or low-impact systems that achieved a narrow but immediate return on investment. However, many of these functions cannot "speak" with each other, let alone do so outside the walls of the institution. To achieve true interoperability, health systems must take a more strategic approach to system investments.

- **Health professionals must be on board.** EHRs have a significant impact on the work of healthcare professionals. Physicians, nurses, and other clinicians must be actively engaged in their implementation.

- **Patients and clinicians must trust the system.** Americans are slowly growing comfortable with the concept of storing their medical data electronically, but they—as well as clinicians—must have confidence that patient data will be protected. The data contained in an EHR sit beyond the control of the individual, and some consumers do not yet trust the system enough to surrender that control when they are uncertain about how their information will be protected and used. The system must be secure in order to reassure all users that violations of privacy will not occur.

- **Collaborative ventures must be supported.** The integration and exchange of health information across disparate organizations lies with Regional Health Information Organizations, or RHIOs. These are multistakeholder organizations that are expected to be responsible for motivating and causing integration and information exchange in the nation's IT-enabled healthcare system. More than 150 RHIOs have been created since they were introduced in 1994, but only a few have matured to the

stage of development where health data are actually exchanged.[9,10]

Unfortunately, early evidence indicates that RHIOs face significant challenges, including the lack of a compelling business case, distorted economic incentives, passive leadership, vendor limitations and software delays, and poor momentum and credibility,[11] as well as concerns about loss of competitive advantage and data misuse.[12] Because RHIOs are considered a foundational building block to the National Health Information Network, they must quickly achieve the ability to achieve true health information exchange, defined as the mobilization of healthcare information electronically across organizations within a region or community. This effort will succeed only if information can truly be exchanged in an environment of trust and if economies of scale can be achieved.

Given these challenges, the active participation at every level of multiple stakeholders is critical to the success of health IT. Fortunately, it appears that stakeholders are working together as never before in order to achieve the vision.

The Critical Interface Between Quality and Health IT

In April 2004, President Bush presented his goal of a health system in which most Americans would have access to an interoperable electronic medical record by 2014. In doing so, Bush established a new office—the Office of the National Coordinator for Health Information Technology (ONC) within the Department of Health and Human Services (DHHS)—to achieve this objective.[13]

The creation of the ONC did more than establish a new office; it established a vision. As a result, the healthcare industry was galvanized to action. Since then, numerous stakeholders have come together in a variety of settings to perform the initial heavy lifting—including definition of goals,

standardization of languages, and standardization of data types. These settings include the following:

- **The American Health Information Community**. AHIC, a federal advisory body, was chartered in 2005 to make recommendations to DHHS on how to accelerate the development and adoption of health IT. AHIC was formed by the Secretary of DHHS to help advance efforts to achieve President Bush's goal for most Americans to have access to secure electronic health records by 2014. Plans are now under way to transition the AHIC to a public-private partnership based in the private sector.

The health IT infrastructure is envisioned as a critical foundation for many aspects of healthcare, including direct patient care, quality, public health, and research. Thus, AHIC has convened several workgroups, which are defining the functionality that must be contained in EHRs and identifying various organizations that will play critical roles. Among these is the Quality Workgroup, which is charged with making recommendations that specify how certified health IT should capture, aggregate, and report data for a core set of ambulatory and inpatient quality measures. Other AHIC workgroups are:

   – Population Health and Clinical Care Connections (with a Biosurveillance Data Steering Group as a subworkgroup);
   – Consumer Empowerment;
   – Chronic Care;
   – Electronic Health Records;
   – Confidentiality, Privacy, and Security; and
   – Personalized Healthcare.

- **The Certification Commission for Healthcare Information Technology.** CCHIT is a federally recognized certification body for EHRs and their networks. It is an independent, voluntary, private sector initiative that, among other activities, certifies specific EHR systems.
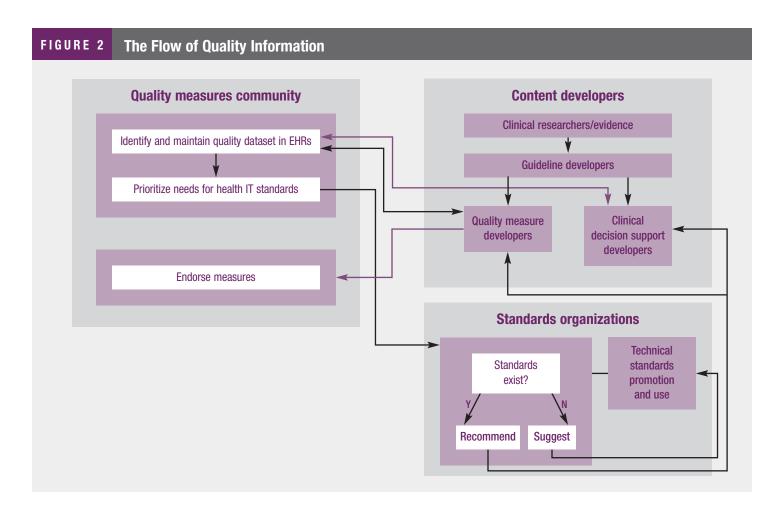
- **Health Information Technology Standards Panel.** HITSP is a multistakeholder coordinating body designed to provide the process within which affected parties can identify, select, and harmonize interoperability standards for communicating healthcare information. A public-private partnership, HITSP operates with a neutral, inclusive governance model administered by the American National Standards Institute in conjunction with the Health Information Management and Systems Society, Booz Allen Hamilton, and the Advanced Technology Institute.

In addition to these important efforts to build a National Health Information Network, several efforts are under way that are focusing specifically on the interface between health IT and quality. Over the last year, the federal government and private sector have stepped up efforts to assure that EHRs possess the necessary capabilities to support quality measurement, improvement, and public reporting. (For a graphic representation of how IT and quality data relate, see Figure 2.) Three important efforts are under way:

- **The Collaborative for Performance Measure Integration with EHR Systems.** This collaborative, which is cosponsored by the American Medical Association and the National Committee for Quality Assurance, is a group of performance measure developers and 15 EHR vendors striving to fashion specifications for performance measures in a way that can be used by vendors.
- **NQF Health Information Technology Expert Panel.** This panel, convened by NQF at the recommendation of the AHIC Quality Workgroup and with support from the Agency for Healthcare Research and Quality, is charged with identifying the types of data that must be captured in EHRs to support quality measurement, quality improvement, and public reporting of performance data. For more information, visit www.qualityforum.org/projects/ongoing/HITEP/.

- **Centers for Medicare & Medicaid Services Community Assessment Record and Evaluation (CARE).** This effort, currently being tested in a demonstration project, aims to improve the real-time information flow between care settings and providers to reduce the risk of patient harm inherent in care transitions. The system uses data currently collected and adds an Internet platform, adheres to commonly accepted IT standards, improves interoperability, and allows providers in multiple settings access to information at once. The goal: to encourage broader use of data collection for quality measurement and payment purposes, facilitate decision support, and allow interaction in the record between patient and provider.

FIGURE 2 The Flow of Quality Information

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These efforts that bridge the health IT and quality communities represent fundamental building blocks needed to create the necessary health IT infrastructure that will help us achieve our quality goals.

Moving Forward

The ultimate goal of a technology-enabled interoperable health record system is to bring critical information to the health professional at the point of care. Direct benefits include safer and more effective care as well as increased efficiency.

The costs to reaching these goals are high, and the challenges great. Yet, although the journey to an interoperable health system is arduous, it is not impassable.

There is steady—albeit slow—progress being made toward interoperability. Disparate stakeholder organizations are working together in a variety of forums to lay the foundation on which the National Health Information Network will be built. Many leading healthcare organizations have successfully transitioned, and some RHIOs are thriving. The challenge is to learn from these successes and generalize to other settings.

Although there is strong evidence that interoperable EHR systems are a good investment for the American public, the value equation looks very different from the perspective of most provider organizations. Providers bear most of the costs—both financial and otherwise—of EHR system implementation, but they receive only a fraction of the immediate financial benefits under our current fee-for-service payment system. Thus, it becomes critical to convince providers of their utility despite the uncertain financial calculus involved. It also is imperative that efforts continue to focus on better aligning the provider payment system with our nation's quality goals.

The challenges may be formidable, but the promise of health IT—safer, more effective and affordable care—is great. Not even the most ardent supporters of health IT will promote it as a panacea, but the benefits both in the quality and efficiency of healthcare are tantalizing. The ultimate goal of a technology-enabled interoperable health record system is to bridge the knowledge gap that plagues healthcare today in order to bring critical information to the health professional at the point of care.

1   Institute of Medicine (IOM), *To Err Is Human: Building a Safer Health System,* Washington, DC: National Academy Press; 2000.
2   IOM, *Crossing the Quality Chasm: A New Health System for the 21st Century,* Washington, DC: National Academy Press; 2001.
3   Arnst C, The best medical care in the U.S.: how Veterans Affairs transformed itself—and what it means for the rest of us," *Business Week;* July 16, 2006. Available at www.businessweek.com/magazine/content/06_29/b3993061.htm?chan=tc&chan=technology_technology+index+page_best+of+the+magazine. Last accessed January 2008.
4   IOM, *Crossing the Quality Chasm: A New Health System for the 21st Century,* Washington, DC: National Academy Press; 2001.
5   IOM, *Key Capabilities of an Electronic Health Record System: Letter Report,* Washington, DC: National Academy Press; 2003.
6   Chaudry B, Wang J, Wu S, et al., Systematic review: impact of health information technology on quality, efficiency, and costs of medical care, *Ann Intern Med,* 2006;144:742-752.
7   Medical Records Institute. Available at www.medrecinst.com/index.shtml. Last accessed January 2008.
8   Blumenthal D, Glaser JP, Information technology comes to medicine, *N Engl J Med,* 2007;356(24):2527-2534.
9   Brown EG, Holmes BJ, McEnroe W, *Regional Health Information Organizations' Modest Start,* Forrester Research; February 13, 2006.
10 *18th Annual Health Information Management and Systems Society Leadership Survey.* Available at www.himss.org/2007Survey/DOCS/18thAnnualLeadershipSurvey.pdf. Last accessed January 2008
11 Miller RH, Miller BS, *The Santa Barbara County Care Data Exchange: Lessons Learned,* California HealthCare Foundation; August 2007.
12 Grossman JM, Kushner KL, November EA, *Creating Sustainable Local Health Information Exchanges: Can Barriers to Stakeholder Participation Be Overcome?* Center for Studying Health System Change and the National Institute for Health Care Management Foundation; February 2008.
13 Executive Order: Incentives for the Use of Health Information Technology and Establishing the Position of the National Health Information Technology Coordinator. Available at www.whitehouse.gov/news/releases/2004/04/20040427-4.html. Last accessed January 2008.