

# health and technology:

## *will health information technology deliver?*

As we move ahead in the 21<sup>st</sup> century, technology will play an ever-increasing role within our daily lives. Technological advancements have revolutionized the way we work, play, communicate, and connect with people across the globe. In 1837 Samuel Morse transformed an electrical current into the first communications device connected by wire; today, personal computers, phones, and wireless devices enable us to instantaneously share ideas and ask questions. Technology breakthroughs have made us smarter, quicker, and more effective than ever before, and we expect that these advances will continue to be incorporated into all aspects of society, including public health and medicine.

### THE PROMISE OF TECHNOLOGY

Innovative technologies are improving individual- and population-focused health outcomes, from new surgical instruments and medical devices, to advancements in vaccine development and delivery to combat global health epidemics. New technology infrastructure designed to consolidate health records and connect providers with patient data is increasing efficiency within local health care networks and improving quality of care. Telehealth – the use of telecommunications and health information technology (HIT) to carry out remote medical interventions, care management, health education, and prevention – has the potential to increase access to quality care among underserved populations; share medical knowledge among providers; and empower patients through virtual house calls, remote monitoring, and other on-demand health services.

We are also beginning to see new health disciplines take shape as a result of technological advances. Since the completion of the Human Genome Project – the identification and mapping of the entire human genetic sequence – researchers have focused on the links between variations in a person's genetic makeup and their reactions to specific diseases. For example, researchers recently isolated at least 10 genes linked to an individual's risk of developing diabetes. The future of genomics promises to help doctors and other health care providers determine why some people get sick from certain infections, environmental factors, and behaviors while others do not (CDC Foundation 2008). In turn, we envision a future where disease prevention and management will be informed by our genetic makeup, and new treatment methods will include molecular-level interventions such

as gene, protein, and germ-line therapies.

As with genetic research, the burgeoning field of nanotechnology – the engineering of functional systems and devices at the molecular scale – has inspired new treatment approaches. Scientists are now developing synthetic, self-assembling nanostructures that have the potential to aid in the regeneration of human nerve fibers, muscles, and organs. In addition, experts believe that our best weapon in the fight against cancer is nanotechnology, which will enable doctors to detect and destroy cancer cells at the molecular level. The National Cancer Institute is supporting clinical research to harness the power of nanodevices and believes they will be used as diagnostic and therapeutic agents and change the very foundations of cancer diagnosis, treatment, and prevention (National Institutes of Health 2004).

### CHALLENGES

► ***Overutilization of New Technology*** – Technology advances will continue to expand the limits of possibility within the fields of public health and health care. Yet while these leading-edge treatments and technologies hold great promise for the future, they may also pose significant challenges. One of the principal concerns is the rising cost of health care due to new technology. According to a recent report issued by the Robert Wood Johnson Foundation's Synthesis Project, the dominant driver of long-term cost trends within our health care system is advancing medical technology, where newer, more costly treatments replace older technologies or provide opportunities for intervention when none existed before. In fact, a technical review panel for the Centers for Medicare and Medicaid Services concluded that about half of real expenditure growth within the U.S. health care system is attributable to technology (Ginsburg 2008).

In many cases, these emerging health technologies diffuse more rapidly than clinical researchers can adequately assess them, which can lead to the overutilization or inappropriate use of such treatments. When a new technology or treatment arrives, providers must pay steep up-front costs to purchase it for their office; once the technology is in-house, providers are understandably motivated to utilize and charge for these new services in order to recoup their initial investment. To further complicate matters, patients

## GETTING BEYOND THE JARGON: KEY HIT COMPONENTS

**CDS (clinical decision support):** Evidence-based embedded logic that supports clinical decisionmaking and reminds or alerts physicians within CPOE or e-Rx platforms.

**CPOE (computerized physician order entry):** A process of electronic entry of physician instructions for the treatment of patients under his or her care. CPOE is considered to be a component of a fully functional EHR that allows physicians, nurses, and clinical staff to electronically track orders for patient care. CPOE is also seen as a tool to reduce preventable medication errors.

**e-Rx (electronic prescriptions):** An electronic medication management system that enables physicians to order appropriate drugs for patients, sends prescription data to pharmacists, and informs nurses on which medications to administer. Many e-Rx systems are integrated with CDS systems to prevent harmful drug interactions and prescreen for patient allergies.

**EMR/EHR/PHR (electronic medical record/electronic health record/personal health record):** Tools that enable the collection, storage, recall, and analysis of patients' health information in central data repositories. EMRs are institutionally focused, while EHRs are designed for cross-institutional data sharing and therefore more valuable to providers. PHRs are consumer-oriented records that are usually Web-based and offer a more limited feature set than EMR/EHR solutions.

**HIE/RHIO (health information exchange/regional health information organization):** A local, regional, or state level network that facilitates the secure exchange of EHR clinical data across multiple providers. HIEs can improve the quality and continuity of care by providing physicians with a complete patient history that reduces clinical errors, decreases redundant testing, and increases operational efficiency through reduced interoffice paperwork. Also known as RHIOs, HIE is a broader term that also encompasses networks managed by multiple partner organizations.

**Telehealth:** The use of medical information exchanged from one site to another via electronic communications to improve patients' health status or expand access to specialized care. Videoconferencing, transmission of still images, remote monitoring of vital signs, continuing medical education, e-health Web portals, and nursing call centers are all examples.

Source: Gaylin 2008; California HealthCare Foundation 2008b

often demand the latest publicized treatments, regardless of efficacy or expense. As health care cost projections continue to rise over the next decade – currently outpacing U.S. gross domestic product growth by 1.9 percentage points per year – patients, providers, and payers must face the sobering challenge of balancing expectations of state-of-the-art care with the need to reduce costs within our health care system (Ginsburg 2008).

One example of this problem is the rising demand nationwide for magnetic resonance imaging (MRI) and computed tomography (CT) scanning. Since the early 1980s, the rapid diffusion of imaging units and the associated jump in utilization rates have led to major increases in costs for Medicare and other payers. While MRI and CT diagnostic imaging technologies offer clear benefits for patients and physicians, experts have questioned the overall cost-effectiveness of these procedures due to the lack of demonstrable improvements in health outcomes as a result of the procedure (Baker et al. 2008).

- **Health Information Technology: A Magical Solution?** – In addition to overutilization concerns, there is much debate over whether HIT – infrastructure designed to securely manage and exchange medical information between health care consumers and providers – alone will solve the multitude of problems facing an underperforming U.S. health care system. At the patient level, HIT investment has the potential to reduce preventable deaths, minimize medication errors, and provide evidence-based support for physician diagnosis and treatment options. At the provider level, electronic health records (EHRs) and tools, such as electronic prescriptions and computerized physician order entry (CPOE) systems, can eliminate administrative paperwork, streamline patient visits, and make offices more efficient. A well-coordinated regional health information exchange (HIE) can record and track patients across multiple providers, offering a complete medical picture of that patient to all parties involved and improving overall continuity of care.

In recent years, reports have suggested that widespread investment in integrated HIT solutions, such as EHRs, physician decision support systems, and CPOE systems, could significantly improve the delivery and management of care and generate considerable systemwide cost savings. In 2005 the RAND Corporation projected annual savings of \$77 billion based on efficiency improvements due to shorter hospital stays, reduced staff and administrative time, and more effective drug utilization (RAND 2005).

Such rosy projections, however, have not gone uncontested. In 2008 the Congressional Budget Office (CBO) released a follow-up study examining the evidence

on the costs and benefits of HIT. CBO Director Peter Orszag explained that HIT “appears to be necessary but not sufficient to generate costs savings; that is, health IT can be an essential component of an effort to reduce cost (and improve quality), but by itself it typically does not produce a reduction in costs” (CBO 2008). Orszag argues that we should not consider HIT as the solution, but rather as a tool necessary to implement systemwide quality improvements and cost savings.

Similarly, a study supported by the Markle Foundation recently warned against false hopes raised by blind HIT adoption, arguing that HIT proponents must resist “magical thinking,” including the notion that isolated HIT investments and standards will fundamentally “fix” a broken health care system (Diamond and Shirky 2008). Rather than focusing on technology adoption and universal interoperability, the study suggests we should work to improve health outcomes for patients using HIT as a means to carry out these changes.

With these cautions in mind, a number of health foundations are making strategic investments in HIT, such as EHRs and HIE and regional health information organization (RHIO) efforts, and new telehealth initiatives that can help improve quality, increase access to care, empower patients, and make our health care system more efficient – provided that funders and providers are realistic in their short-term expectations for these innovative new technologies.

### IMPROVING QUALITY AND HEALTH OUTCOMES THROUGH HIT

While efficiency and cost savings have become key “selling points” for widespread HIT adoption, these outcomes are part of a larger vision of a future health care system in which new technology and infrastructure will deliver higher quality care and improved patient outcomes. When implemented properly, EHRs not only consolidate health data and reduce paperwork but also offer critical clinical decision support (CDS) tools to prevent adverse drug reactions and offer evidence-based recommendations concerning treatment and care. At the regional level, HIE initiatives designed to securely exchange health records and clinical data between providers can reduce duplicate – and potentially dangerous – medical procedures and tests. These data-driven HIT systems also enable providers and health departments to collect, analyze, and report clinical outcomes to track performance and advance the quality of care provided to patients.

The Community Clinics Initiative (CCI), a collaboration between Tides Foundation and The California Endowment, is one example of a regional HIT investment that has shifted

focus toward quality improvement. Established in 1999 CCI provides resources, evidence-based programming and evaluation, education, and training to support community health centers and clinics throughout California. To date, CCI has awarded more than \$69 million in grants, covering 163 clinics and 15 regional consortia of clinics. Although the initiative initially focused on developing basic information technology (IT) infrastructures (hardware, software, and personnel) for clinics, it evolved to include an understanding of how improved IT infrastructure contributes to improving health outcomes for both individual patients as well as the communities they serve. In theory, CCI views its HIT work in the context of a larger process:

**Improved IT Infrastructure**  
*contributes to*  
**Better Data and Communications**  
*contributes to*  
**More Data-Driven Business and Clinical Decisions**  
*contributes to*  
**More Efficient Clinics and Higher Quality Care**  
*contributes to*  
**Stronger, Healthier Communities**

Source: CCI 2006

Under this vision, CCI provided grantees with additional supports, including ongoing technical assistance; a learning community to support cross-program reflection; and access to CCI’s on-line community, which provides news, e-mail updates, and discussion forums. CCI is also working with clinics to utilize the comparative data they are now able to collect from an operational and a health outcomes perspective (CCI 2006).

As a complement to CCI, a group of five California grantmakers in 2008 launched Tools for Quality, a \$4.5-million technology program aimed at improving chronic disease care across the state. Jointly funded by the Blue Shield of California Foundation, the California HealthCare Foundation, CCI/Tides, Kaiser Permanente Southern California Region, and The California Endowment, Tools for Quality will provide 33 clinics with up to \$40,000 each in matching funds to support chronic disease management systems (CDMSs), software designed to help doctors and nurses track and manage the care of patients suffering from chronic diseases such as diabetes, asthma, and depression. Although less complex or ambitious in scope than EHRs, CDMSs are a cost-effective way to introduce quality

improvements for providers by instituting chronic care regimens and automating patient follow-up (California HealthCare Foundation 2008a).

Other demonstration projects, including ones funded from the private sector, are also beginning to show how HIT can empower physicians and improve health outcomes. The Massachusetts eHealth Collaborative (MAeHC) was formed in 2004 as a nonprofit initiative of the physician community to build a statewide strategy for ubiquitous adoption of EHRs and establish community-focused RHIOs to enhance the quality, efficiency, and safety of care throughout Massachusetts. Initially funded by Blue Cross Blue Shield of Massachusetts, the \$50 million project targeted three pilot communities within the state in order to implement fully functional EHR systems with CDS tools and develop local HIEs connecting community providers. Since then, MAeHC has partnered with 34 statewide health organizations and has brought over 130 practices on-line with EHRs using a centralized support model for training and technical assistance (MAeHC 2008a). MAeHC has also developed a Quality Data Center that reports on physician-level performance measures developed with the help of the Massachusetts Health Quality Partners. Based on the early success of MAeHC's pilot communities, Massachusetts has allocated \$25 million in its 2009 state budget to fund new HIT investments in an effort to support statewide HIT adoption (MAeHC 2008b).

While the quality improvements delivered through HIT investment may be well documented, it is not safe to assume that these investments will produce immediate benefits for patients or providers. Funders seeking to implement successful HIT projects should expect to spend a significant amount of time collaborating with providers and other stakeholders in order to define the goals of the investment, ensure buy-in and physician trust, prepare staff for both clinical as well as technical workflow changes, and offer ongoing technical assistance and group reflection to ensure that the goals and health outcomes are met over time.

### INCREASING ACCESS TO CARE

In addition to improving quality of care, HIT can also be seen as a tool for providers to help expand access in underserved communities. Administrative and clinical applications have the potential to both strengthen the organizational capacity of those serving the uninsured and underinsured and improve efficiency and patient outcomes (Grantmakers In Health 2008).

One strategy for increasing access to health care is through investment in EHR systems for local clinics serving vulnerable populations. As one component of its Healthcare

Access Program (HAP), St. Joseph Community Health Foundation, a small foundation serving Allen County, Indiana, has supported the adoption and implementation EHRs at multiple safety net provider locations. Established in 2000, HAP convenes low- and no-cost primary health care providers, such as the county's free clinic and federally qualified health centers (FQHCs), to organize and administer projects that increase quality and efficiency and that reduce the cost of health care for the poor and uninsured. In 2002 the foundation and HAP partners began working with a local HIT vendor to implement EHRs in the county's free clinic. St. Joseph Community Health Foundation also provided grants for the purchase of hardware – computers, servers, and other equipment. The county's two FQHCs and clinics administered by the county health department then adopted the EHR system (Grantmakers In Health 2008).

Once site-level EHR systems were implemented, St. Joseph Community Health Foundation and HAP partners made further investments to establish a shared system that would capture the county's uninsured, Medicaid, and State Children's Health Insurance Program patients to improve care for patients receiving services at more than one safety net location. Today the shared clinical data are frequently used by Allen County's safety net providers in caring for patients with chronic medical conditions, giving providers access to selected information on patients' past and present diagnoses and treatment. The shared system has also reduced paperwork and made safety net providers more efficient throughout their day-to-day operations.

St. Joseph Community Health Foundation has provided more than \$500,000 in grants for HIT over the last several years. This investment has been matched almost dollar for dollar through in-kind contributions, pro bono and reduced-rate technology services, and other donor investments. One of the most important roles played by the foundation, however, was that of neutral convener, bringing stakeholders together to ensure an interoperable approach to HIT development.

The Maine Health Access Foundation (MeHAF) is another foundation investing in multiple HIT initiatives that support their mission to expand access to health care and improve the health of all Maine residents. One such project, HealthInfoNet, is a statewide HIE designed to bring the most current and comprehensive clinical information to all caregivers across the state. In 2004 MeHAF – along with Maine CDC, the Maine Quality Forum, and the Maine Health Information Center – came together to study whether or not Maine was ready to develop a statewide HIE. The study found that strong support existed for such a system, and by 2006 HealthInfoNet was established as an

independent nonprofit organization to manage its development and engage stakeholders such as doctors, hospital officials, consumers, insurers, business leaders, and state government representatives.

Since its inception, MeHAF has invested more than \$3 million in the HealthInfoNet initiative, including the planning and development of a two-year statewide demonstration program that began in early 2008. More than 2,000 healthcare providers, including 15 rural and urban hospitals across Maine and one-third of practicing physicians, are currently part of this demonstration. Participating hospitals and physician practices currently oversee more than half of the state's annual inpatient hospital admissions, half the annual emergency department visits, and nearly 40 percent of Maine's outpatient visits each year. As this demonstration enters its second year in 2009, providers across Maine will gain access to a more complete and up-to-date clinical profile of their patients in order to deliver better quality care and improve the coordination of care, particularly for those patients who see several providers and receive care in more than one community or care setting (HealthInfoNet 2009).

Although HealthInfoNet may not address the broader issue of access to health insurance for the uninsured, MeHAF views a statewide HIE as a critical step toward improving health services for vulnerable and underserved populations – especially those without consistent access to primary care due to a lack of coverage. For emergency departments overwhelmed by uninsured patients, HealthInfoNet can also enhance care coordination and build in administrative efficiencies that enable providers to handle more cases and offer improved continuity of care for those outside the traditional health care system.

MeHAF has also spent a significant amount of time and energy researching the benefits and challenges of telehealth as a means to improve access to care within Maine's rural population. In 2005 MeHAF sponsored the meeting *Enhancing Current Telemedicine Services* to discuss both the opportunities and barriers facing more widespread telehealth adoption in Maine. MeHAF then partnered with staff from the Governor's Office of Health Policy and Finance to convene a multisectoral State Health Plan Telemedicine Workgroup and commissioned the Center on Telehealth and E-Law to conduct a national study of state and federal telehealth policies. Based on the results of the workgroup and the national study, MeHAF found that, despite the early promise of telehealth models, there are a number of barriers to adoption, including regulatory challenges, reimbursement issues, and a lack of comfort on the part of existing providers and patients to utilize new telehealth technologies. Nevertheless, MeHAF's work has set the stage for an ongoing

## SETTING OBJECTIVES FOR HIT INVESTMENT

The Markle Foundation's Connecting for Health initiative released formal recommendations to help guide future HIT investment and health care reform. Connecting for Health, a collaborative representing more than 100 organizations from all major perspectives in health care, engages stakeholders to develop and articulate practical approaches to manage complex HIT and information policy issues.

To modernize the health care system, HIT investments must be made with clear requirements ensuring trusted information sharing and achievement of health improvement goals. Specific policy and technology requirements include core privacy principles, sound network design principles, and adequate mechanisms to ensure proper oversight and accountability.

The Markle Foundation laid out expectations for stakeholders involved in new HIT investment:

1. Have clear, specific, and achievable health improvement goals (such as reducing hypertension, improving cardiac mortality rates, and increasing chronic medication adherence).
2. Outline effective strategies for using technology and HIT to reach these goals.
3. Articulate how IT and non-IT investments will be combined to achieve objectives. Examples of non-IT investments might include training, implementation support, care delivery redesign, chronic care management, and patient engagement.
4. Motivate widespread availability and use of key electronic information (medication history, lab and imaging results, after care summaries) to reach health goals.
5. Support rapid deployment and impact across entire communities.

Source: Markle Foundation 2009

dialogue among Maine telehealth stakeholders and has inspired further research on telehealth solutions for rural and remote communities (MeHAF 2009).

## CONCLUSION

Over the next decade, the rapid development of new technology within the health care sector has the potential to generate both significant benefits and severe costs for patients, providers, and payers. Setting our sights on the

year 2020, it is important that health funders proceed with caution and avoid the wishful thinking of immediate health care transformation through technology investment. Nevertheless, funders committed to improving quality of care, expanding access, empowering patients, and increasing efficiency within our health care system have a unique opportunity to support their communities using a variety of technology-focused strategies. Above and beyond the

technology itself, however, an array of stakeholders must learn to utilize, trust, and adapt to these new tools as part of their mission to achieve the highest quality care for the patients they serve. Until and unless we recognize and internalize the clinical value of HIT and its impact on quality and efficiency, it is unlikely that we will see significant changes in our health care system, regardless of the incentives or mandates we choose to employ.

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