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Electronic Health Records: How Close? How Far to Go?

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OVERVIEW — *This paper looks at the central role of the electronic health record (EHR) in health information technology. It considers the extent to which EHRs are in use and initiatives designed to increase their prevalence, as well as barriers to the widespread adoption of EHRs and efforts to surmount them. Particular attention is given to such obstacles as cost, the professional culture of physicians, standardization, and legal questions.*

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Electronic Health Records: How Close? How Far to Go?

Clinical histories at the touch of a key. Personal Internet portals. Connected communities. Real-time public health reporting. Visions of the future of health care have turned oracular and optimistic—and, as so often in American prophecy, they center on technology. The July 2004 Secretarial Summit on Health Information Technology, *Cornerstones for Electronic Healthcare*, was inspirational in tone as government and private-sector leaders put forth a *Framework for Strategic Action* for achieving a national health information infrastructure.[1]

Health information technology (IT) encompasses tools for hospitals, physicians and other clinicians, and patients. Computerized provider order entry (CPOE) systems have received a great deal of attention since the employer-sponsored Leapfrog Group made CPOE one of its first criteria for rating hospitals on patient safety. Personal health records and the ability to communicate electronically with physicians and care managers are becoming important to patients, particularly those coping with chronic disease. Decision support systems are designed to offer physicians easy access to evidence-based medicine and treatment guidelines. Electronic health records (EHRs) can serve in many settings—and in combination with other tools—but are particularly urged on physicians as a replacement for paper files.

At the spiritual as well as practical center of the IT campaign is a belief that health care can be dramatically improved if accurate information is collected, arrayed, and communicated. Widespread use of EHRs is expected to eliminate many of the problems inherent in a paper-based system: information that cannot be retrieved, or deciphered, or checked against the notes in another doctor's office; tests repeated because earlier results are not available; transitions where crucial information is left behind when a patient moves from one care setting to another. All of these can result in care that is not as effective as it could be or even harmful to the patient.

EHRs penetrated the national policy consciousness in 1991, when an Institute of Medicine (IOM) committee asked why the automation of patient records was proceeding so slowly and what might be done to accelerate it.[2] The Computer-based Patient Record Institute the committee recommended to facilitate the development and dissemination of electronic records never became the policy engine envisioned. However, public- and private-sector groups such as the National Committee on Vital and Health Statistics (NCVHS) and the eHealth Initiative took up the cause of EHRs and the infrastructure to support them.

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The IT banner has been taken up by political leaders. President Bush has called for nationwide EHR implementation within ten years (that is, by 2014). Presidential candidate John Kerry's target year is 2008. Senate Majority Leader Bill Frist would like to see everyone enrolled in a government health plan, including Medicare and Medicaid, have an EHR within three years.[3] Are these realistic goals? How much progress has been made toward EHR implementation, and how much remains to be done?

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EHR IN PRACTICE

Various surveys have attempted to assess the extent to which hospitals and physicians are using EHRs. For example, *Modern Physician* found variation by specialty: radiologists reported EHR use at 60 percent, but family practice physicians reported use at 20 percent and pediatricians and surgeons trailed even further.[4] Harris Interactive, a market research and consulting firm, found that 17 percent of primary care physicians used EHRs in late 2001; by 2002, 30 percent of physicians surveyed said EHRs were in use in their practices.[5] In a 2003 Deloitte Research/Fulcrum Analytics survey, 12.9 percent of respondents—physicians in mostly small practices— reported using EHRs.[6] The American Academy of Family Physicians in July 2004 released a survey indicating that a majority of family practitioners either have an EHR system in place or plan to implement one within the year.[7]

Dr. David J. Brailer (now National Coordinator for Health Information Technology) has suggested that survey results be evaluated with caution. As he observed in a paper published by the California HealthCare Foundation (CHCF) in October 2003, most studies of IT use have been industry-sponsored and nonrandom, making use of subjective recall survey instruments completed by self-selected respondents.[8] Self-selection suggests a bias toward those more involved or at least interested in IT.

Surveys have highlighted an association between IT use and larger, more urban physician practices. Technology investment and innovation are also associated with "closed" systems of care, such as the Veterans Health Administration (VHA) or a staff-model health maintenance organization (HMO), where one entity is both the insurer and the provider of health care.

The leaders in EHR system implementation have tended to be integrated delivery systems, such as Intermountain Health, Geisinger Health System, and the Mayo Clinic. Kaiser Permanente (KP), abandoning an earlier effort to custom-design an IT system that would reconcile its separate regional operations, in 2003 committed $1.8 billion to the implementation of an EHR system based on software developed by Epic Systems. (The figure used in June 2004 testimony for the full clinical IT project, known as KP HealthConnect, was $3 billion.[9]) HealthConnect debuted at selected sites in KP's Hawaii region in April 2004, with other regions scheduled to follow.

IT leadership is found in the public sector as well. VHA's Computerized Patient Record System (CPRS) has been used by clinical care teams at over 1300 sites of care throughout the VA. CPRS, released in 1997, is the central, clinical component of the larger Veterans Health Information Systems and Technology Architecture (VistA), which also incorporates administrative and business functions, such as enrollment and eligibility, scheduling, financial, and information management.

Department of Defense (DoD) facilities have operated with EHRs for a decade; however, as with KP, their systems have been plagued with multiplicity and a lack of central coordination. DoD's Composite Health Care System II project (estimated to cost $3.8 billion over 20 years) is designed to consolidate clinical records for some 9 million active duty military personnel and their families. Tested at four pilot sites in 2002, CHCS II when fully deployed will be available at 100 hospitals and 500 clinics. The process is scheduled to be complete by the end of 2006, though there have been some slowdowns and user resistance in the early stages.[10]

Other countries, such as Canada, Australia, and England, have made national commitments to health IT and are farther along than the United States in the development and systemic deployment of EHRs. However, in each case those national governments have greater statutory decision-making authority.

DESIGN OF AN EHR

Interest and investment in EHR technology have been driven by the conviction that its use can reduce errors, improve quality of care, and increase efficiency. More than 75 percent of providers responding to a survey by the Medical Records Institute cited improving workflow, improving care, exchanging health information, and reducing errors as motivating factors for adopting EHRs.[11] Other factors playing a role are compliance with the Health Insurance Portability and Accountability Act (HIPAA) of 1996, the quality reporting required by some health plans, improvements in the technology itself, and competition for patients and prestige.

Because most physicians do not moonlight as software designers, potential customers for EHR systems have been largely dependent on vendors to tell them what an EHR is and what it ought to do. Even KP, a large integrated delivery system with technologically savvy staff, found in-house design frustrating. (Some vendors, it should be noted, have other preferred names for the EHR concept, such as electronic medical record or clinical information management system.)

Most people casually familiar with health care and IT probably assume they know what an EHR is, but, as *Modern Healthcare*'s John Morrissey wrote, "the scope of an electronic record far exceeds the notion of mere clinical record-keeping that the technology's name conjures up."[12] A high-performance EHR system very likely will incorporate computerized order

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entry and clinical decision support modules for physicians and some type of medical record access and self-management support for patients.

What an EHR should properly encompass, and what characteristics define it, has been a matter of much discussion in policy circles. Particularly in looking toward possible incentives for EHR adoption, objective criteria for defining an acceptable EHR are seen as critical. In May 2003, the Department of Health and Human Services (DHHS) asked the IOM to provide guidance on the key care delivery–related capabilities of an EHR system in four situations: hospital, ambulatory, nursing home, and personal health record. The IOM response described eight "core functionalities" of an EHR system (see text box),[13] and they further suggested all eight should work in concert to meet five EHR system criteria:

- Improve patient safety
- Support the delivery of effective patient care
- Facilitate management of chronic conditions
- Improve efficiency
- Be feasible to implement.

Core Functionalities of an EHR

- Health information and data storage and access (others call this viewing)
- Results management (labs and tests)
- Order entry and management
- Decision support
- Electronic communication and connectivity (also referred to as messaging)
- Patient support
- Administrative processes (such as scheduling and billing)
- Reporting and population health management

DHHS subsequently asked the standards-development organization (SDO) Health Level 7 (HL7) to build on the IOM model, defining the infrastructure necessary to support the IOM's functionalities. Founded on a mission "to provide standards for the exchange, management, and integration of data that support clinical patient care and the management, delivery, and evaluation of healthcare services,"[14] HL7 went on to develop and approve a draft functional model and standard for an EHR system, intended to give purchasers a standard by which to judge whether a particular system has the appropriate capabilities. The "EHR System Draft Model and Standard" has been registered with the American National Standards Institute (known as ANSI) for a trial period of up to two years. Its use is entirely voluntary.

In the absence of firm, required standards, EHRs in use today have evolved as a collaboration between technology vendors and their clients. What suits an urban hospital system is unlikely to be what a primary care physician group finds workable, so modification (even with the added cost it entails) is the norm. As with any new technology, vendors have learned as they have applied their products in new settings. Not all experience has been good, of course; some health care entities have bought packages that turned out not to meet their needs and were scrapped altogether.

Although it adds expense and complicates interoperability, customization by organization doubtless will continue even when the nationwide

guidelines envisioned by DHHS are established. Some say that complete standardization of a record implies standardization of medical practice and process, which is a distant (and far from universally welcome) prospect. However, first-generation standards are expected to permit DHHS and other health care purchasers to ensure that an EHR system possesses capabilities deemed essential at this time.

WHAT IS THE HOLD-UP?

Policymakers and many health industry trade groups are vocal in support of the EHR as a necessary next step to health care improvement. Speakers at the Secretarial Summit called for—and pledged—widespread adoption. Though some physician leaders embrace IT with zeal, and many have used EHRs comfortably for years, the bulk of their fellow practitioners have stayed with paper-based recordkeeping.

It seems evident to most that increasing the ability of health care providers to access accurate information about their patients has the potential to improve both the quality and efficiency of care. However, potential improvement may not outweigh financial and practical realities. Several issues are involved:

Cost

In survey after survey (for example, those conducted by the Medical Records Institute, the Health Information and Management Systems Society, and the Medical Group Management Association[15]), funding is cited as the most serious impediment to EHR adoption. A study by CHCF of EHRs in small practices found that initial costs ranged from $15,000 to $50,000 per physician, with a median of $30,000, plus revenue losses for weeks or months after implementation.[16]

The notion that a practice will save time and money in the long run is a hard sell, particularly when most of the savings that may be generated by doing fewer tests and avoiding hospitalizations accrue to health insurers or patients, not providers. As the Medicare Payment Advisory Commission (MedPAC) observed in its June 2004 report to Congress, "Payment systems that tie reimbursement to the volume of services delivered…may penalize providers who improve quality in ways that result in fewer units of service."[17] In effect, a business case for EHRs is lacking; that is, a generally convincing demonstration that investment in IT will pay off does not seem to exist.

Practice Disruption

In a paper touting the "paperless medical office" for internists, the American College of Physicians acknowledged the turmoil that can accompany installation of an EHR system. Time must be devoted to working with the vendor to customize the system to meet practice needs, to bring it online, and to test it. Staff must be trained on new software and new

In survey after survey, funding is cited as the most serious impediment to EHR adoption.

office protocols. Productivity for both administrative and clinical staff is likely to suffer during the learning period. Partners HealthCare, a Boston delivery system that includes one of the nation's most-wired hospitals, estimates that physician productivity dips 20 percent for the first three months when a new system is put in place. Even after the initial phase, maintenance and upgrades and training of new staff represent ongoing interruptions and costs.

Adjusting practice workflow to incorporate EHR use may be challenging, but this adjustment is viewed by experts as perhaps the critical determinant of the electronic foray's success. Looking from the other direction, the EHR must also be designed to facilitate workflow. For example, an EHR that flashes dozens of prompts and alerts that the clinician must click through every time he or she opens a record is asking to be ignored. One study found that user satisfaction with an EHR is most highly correlated with on-screen design.[18]

Embracing new technology means changing time-honored ways of practicing medicine.

Culture

Embracing the new technology means changing time-honored ways of practicing medicine. Some of the newer physicians practicing had experience with EHRs in medical school, others in a VA or other hospital rotation, but many were trained by methods that did not include a computer at all. Putting the EHR into daily practice may be difficult for these latter physicians to accept, as they may see the machine coming between themselves and their patients in a way that jotting notes on paper does not. Others are conditioned to regard data entry as someone else's job. Some have always distrusted and denounced "cookbook medicine," in which a physician's experience and judgment are perceived to be jettisoned in favor of a program that treats all cases with the same recipe.

Technology Trepidation

EHR technology is still developing, and failure is still a possibility. A clinician may legitimately fear making a large investment that could, as one put it, "all go up in smoke." A related fear is making a premature or wrong choice—in effect, committing to VHS as DVD takes off. Whether to try to integrate existing computer systems with a new EHR or to start over from scratch can be a dilemma with considerable financial implications, particularly for hospitals and delivery systems. Many physician practices that have not ventured into electronic clinical data collection have automated systems for billing and other administrative functions that would need to dovetail with a new EHR. Ongoing vendor support for training, troubleshooting, and updating is an unknown, in terms of both cost and availability.

Confidentiality of patient data remains a concern for physicians and patients alike. Security devices such as protected passwords and data encryption

notwithstanding, there remains what one observer described as "the spectre" of personal medical details on the Internet at the touch of a button.

Communication is also an issue. An EHR may be seen as useful within a practice, but its potential utility will be severely limited if a physician cannot receive information from, or transmit it to, a hospital, lab, pharmacy, or other physicians involved in a patient's care. This capability may come more readily within an integrated system than for an unaffiliated physician practice. Among unrelated entities, there may be reluctance to share patient data considered proprietary. Generally, "interoperability" remains more mantra than reality.

Trepidation sounds like something that can be conquered, and indeed this is likely to occur as technology is refined and going electronic becomes a competitive imperative. But progress is not necessarily smooth. A survey of hospital chief information officers revealed that one-third had been involved in a major delay or failure of a clinical IT initiative in the past 18 months.[19]

Even more important, technology is not a talisman against all error. Humans still write codes and define protocols, occasionally with mistakes, and computers still sometimes corrupt files or send out garbled or incomplete messages. As an example, an incorrect and potentially fatal dosage of potassium chloride was prescribed for an infant at a Cincinnati hospital because the order set in the computer system was wrong; fortunately, an experienced nurse caught the mistake.[20] In this context, some observers have raised the question of who is liable if system problems contribute to malpractice.

Joan Ash and colleagues at Oregon Health & Science University documented a pattern of persistent data entry and information retrieval errors caused by a mismatch between software and patient care workflow. In particular, they point to "juxtaposition" errors (clicking the icon next to or down from the one intended) and problems resulting from a sense that entering data is "the same as completing a successful communication act" and thus failing to initiate a follow-up.[21]

Legal Barriers

Laws designed to offer protection against fraud and abuse may have unintended consequences when it comes to IT. Such laws did not, in their drafting, contemplate interoperable health IT arrangements that necessarily involve relationships and sharing among various providers. The physician self-referral law [known as the Stark law, or Stark rules, after its original sponsor, Rep. Pete Stark (D-CA)] prohibits a physician from referring patients to any entity if he or she (or an immediate family member) has a financial relationship with that entity. The anti-kickback law prevents an individual or entity from offering or accepting payment of any kind to induce patient referral or purchase of an item or service covered by any federal health care program.[22] How these laws apply to IT

Technology is not a talisman against all error.

arrangements is unclear enough to serve as a deterrent to their establishment in some cases. For example, a hospital may be in a good position to assist its physicians to implement EHR successfully, but the provision of software, hardware, or support could trigger conflict with the laws. Because penalties for violation can include exclusion from participation in federal health care programs and imprisonment, caution on the part of health care attorneys is understandable.

With this in mind, the *Framework for Strategic Action* suggests an update to the physician self-referral and anti-kickback protections to accommodate IT sharing. However, crafting such an update will be a delicate business, even within DHHS. The official response from the Office of the Inspector General to the draft of an August 2004 Government Accountability Office (GAO) report on the subject contained this somewhat severe observation: "The report fails to address the risk of fraud or abuse that might arise when hospitals or other entities give valuable items or services to potential referral sources. The Federal anti-kickback statute and the Federal physician-referral law provide important protections against fraud and abuse."[23]

The GAO report also suggests that provider concerns about antitrust allegations, implications for tax-exempt status, and fear of malpractice liability (that is, having access to more information may be seen as a responsibility to know and act on that information) may create additional reluctance to commit to an EHR system.

"Short-term finances will determine whether [most U.S. physician groups and hospitals] invest in EHR."

WHAT IS BEING DONE?

Cost

The *Framework for Strategic Action* observes that those organizations currently operating an EHR system must either be realizing a positive return on their IT investment or have decided that mission or market differentiation was worth the investment in the absence of a positive return. The document goes on to acknowledge, however, that "very few physician groups or hospitals in the United States [are] able to sustain high capital expenses or operating losses over the long term simply because of mission or strategy. For the rest, short-term finances will determine whether they invest in EHR."[24]

DHHS has announced plans to explore various incentives to speed up EHR diffusion. Among these are regional grants and contracts to regions, states, or communities for EHR adoption and health information exchange; low-rate loans for EHR adoption; and actual payment for the use of EHRs via the Medicare physician fee schedule. In the meantime, the Health Resources and Services Administration and the Agency for Healthcare Research and Quality have made IT-related grants in fiscal year 2004. The Kerry-Edwards campaign has called for a "quality bonus" offering financial incentives and rewards to health care providers who invest in IT.[25]

Whether such incentives will prove sufficient to motivate widespread change remains to be seen. Some IT proponents advocate a "Hill-Burton" approach to health IT, a reference to legislation enacted in 1946 to provide direct federal grants to modernize hospitals that had become obsolete due to lack of capital investment during the Depression and World War II. In return for the funds, hospitals agreed to provide free or reduced-cost medical care to persons unable to pay. (What the trade-off might be for IT capital has not been defined.)

Some private-sector organizations have taken a role in the spread of IT, though the EHR component does not necessarily come first. For example, Wellpoint Health Networks announced in January 2004 that it would spend $30 million to give 20 percent of its network physicians (about 19,000 people) either a computer system to automate claims administration or a hand-held device to facilitate electronic prescribing.[26] Harvard Pilgrim Health Plan and EHR vendor A4 Health Systems teamed up to offer electronic claims submission capability to physicians who have already signed on for the A4 Health Systems practice management system. The American Academy of Family Physicians' (AAFP's) Partners for Patients initiative helps physicians purchase technology at a discount from vendors who have agreed to adhere to AAFP's standards for affordability, interoperability, and data stewardship. Geisinger Health System allows local physicians who are not Geisinger employees limited access to their EHR for patients these physicians may also be treating. BlueCross BlueShield of Massachusetts has announced that it intends to underwrite some portion of EHR systems being tested with physicians and patients in the state.

Interoperability: Nomenclature and Other Standards

Perhaps the most obvious feature of an EHR is that it must contain information. In handwritten notes on paper, a physician may use whatever terminology he or she prefers. Effective communication among clinicians and care settings demands common definitions of the symptoms or conditions on which diagnosis and treatment are built.

A comprehensive clinical terminology, SNOMED-CT (for Systematized Nomenclature of Medicine - Clinical Terms) was made publicly available in May 2004 through an agreement between DHHS and the original developers, the College of American Pathologists. (DoD and VA also contributed to the $32.4 million dollar licensing fee.) SNOMED-CT comprises terms for more than 360,000 medical concepts. In announcing the contract, Secretary Thompson said, "Why are we [making it available] for free? We're doing it because we want you to use it." In spite of its inclusiveness, SNOMED cannot at this point serve all of a physician's needs; for example, it must be coordinated (or "mapped") with the ICD-9 terminology that is used for billing purposes.

Effective communication among clinicians and care settings demands common definitions.

SNOMED is a means of addressing what to enter in predetermined electronic fields (themselves agreed to as "content" standards). Another necessity is data exchange, or messaging, standards. These exist in a number of components, with separately developed standards for:

- Administrative data (the X12 standard of the ANSI accrediting standards committee's subcommittee on insurance working group)
- Clinical data (by HL7)
- Medical images [by SDO DICOM (Digital Imaging and Communications in Medicare)]
- Prescription data (NCPDP Script, by the National Council for Prescription Drug Programs);
- Laboratory data [LOINC (Logical Observation Identifiers, Names, and Codes), by the Regenstrief Institute]
- Medical device data (IEEE standard 1073, by the Institute for Electrical and Electronic Engineers).

The fact that such standards are available for use does not mean that they are necessarily in use, nor does it mean they are in final form. Here, too, much depends on vendors. They may or may not build various standards into their products. Achieving general interoperability will require agreements among—at a minimum—purchasers, vendors, manufacturers, SDOs, and regulators.

The IOM has called on federal government health programs to take the lead by incorporating the standards detailed above into their contractual and regulatory requirements.[27] Although this has yet to happen, the Consolidated Health Informatics Initiative, a joint effort of all federal agencies engaged in health care, has taken a big step by committing to a common set of standards to advance the electronic exchange of clinical data across the federal government. Included among these are the HIPAA transactions and code sets for billing and administrative functions that are now required of health plans, clearinghouses, and some providers, as well as the package of messaging standards detailed above.

Other Initiatives

The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 contained a number of provisions relating to health IT. (One major focus, electronic prescribing, is not addressed in this paper.) Participants in a Chronic Care Improvement pilot program will be required to use technology to monitor patients and offer guidance to them, as well as to maintain a clinical information database to track patients across care settings and measure outcomes. A Medicare Care Management Performance Demonstration will reward physicians for using health information technology to manage clinical care for Medicare beneficiaries and electronically reporting clinical quality and outcomes measures.

The Consolidated Health Informatics Initiative, a joint effort of all federal agencies engaged in health care, has taken a big step by committing to a common set of standards.

Also in the works is a subset of that demonstration, Doctors' Office Quality - Information Technology (DOQ-IT), which promotes the use of EHRs and quality reporting in primary care physician offices. In a four-state pilot, Quality Improvement Organizations (QIOs, which are Medicare contractors) are offering free consultation and technical assistance to primary care physicians who wish to learn more about EHRs and/or begin using them. The effort is being led by the California QIO, Lumetra, in partnership with AAFP. The Centers for Medicare and Medicaid Services (CMS) has also awarded funding support to AAFP's own six-practice EHR implementation pilot.

VA and DoD are working toward fully interoperable EHR systems through an initiative called Health*e*People (Federal). VA Acting Deputy Chief Informatics Officer for Health Dr. Robert Kolodner testified in June 2004 that the departments' strategy has three components: (*a*) joint adoption of global information standards; (*b*) collaborative software application development and acquisition; and (*c*) development of interoperable data repositories. The end product will be a "virtual" health record accessible by authorized users throughout DoD and VA.[28] The departments continue to project a debut date in late 2005, though GAO for its part continues to warn that the absence of "explicit architecture and critical project management" make attaining this goal doubtful.[29]

On another front, VA is working with CMS to offer a version of the VA's EHR to providers in rural and underserved communities. Called VistA-Office EHR, the new version will be based on VistA, but it will be configured specifically for physician office and clinic use.

Medicaid programs have not been prominent in IT initiatives, although Tennessee has plans to change this. Governor Phil Bredesen announced in July that his administration hopes to launch a $10 million EHR pilot for TennCare beneficiaries in the Memphis area. Physicians and administrators from the Memphis Regional Medical Center and Vanderbilt University Medical Center are pledged to the effort.[30]

Some communities, such as Santa Barbara, Indianapolis, Seattle, and Spokane have begun to address interoperability on a local level. The Health Resources and Services Administration and the Foundation for eHealth Initiative recently awarded grants to nine communities to pursue local projects in electronic health information exchange.

In the private sector, three interested groups [the Healthcare Information and Management Systems Society (HIMSS), the National Alliance for Health Information Technology, and the American Health Information Management Association] have joined forces to launch the Certification Commission for Health Information Technology. The new organization will certify IT products for compliance with "a baseline set of features and functions," such that products offered in the marketplace may be measured against a functional standard.[31]

VA and DoD are working toward fully interoperable EHR systems.

A WORK IN PROGRESS: MEASURES FOR THE MEANTIME

As sketched above, many efforts are in progress to reach the goal of EHRs for all. Some IT proponents have suggested that attention be given to developing tools that could function as EHR components in the long term but also enhance quality, accuracy, and safety in the meantime.

Continuity of Care Record

The Continuity of Care Record (CCR), already well along in development, is a project conceived originally by ASTM International,[32] the Massachusetts Medical Society, HIMSS, the AAFP, and the American Academy of Pediatrics. (Others have signed on since.) Its sponsors define it as a "core data set of the most relevant facts about a patient's healthcare," organized to be transportable and accessible to patients and clinicians across care settings.[33] A CCR is a snapshot, designed for one transaction (such as a referral to a specialist, transfer, or discharge), not a complete health history. A critical characteristic—and a selling point—is that the CCR can be technology-neutral, that is, permit data to be prepared, displayed, and transmitted either on paper or electronically.

A Continuity of Care Record is designed for one transaction, such as a referral to a specialist, transfer, or discharge.

The CCR project is essentially another standards development effort. Elements of the core data set approved in April 2004 include items in several categories:

- CCR identifying information (when and why this record is created, by whom, and where it is going)
- Patient identifying information
- Patient insurance/financial information
- Patient advance directive
- Patient health status (as appropriate, includes condition, diagnosis, or problem; family history; known risk factors; medications; immunizations; vital signs; laboratory results; procedures/imaging)
- Care documentation
- Care plan recommendation
- Practitioners participating in patient's care

Additional domain-specific applications, such as for personal health records, disease management, and to document care for payers, are under consideration and, in some cases, are being designed.

Registered ASTM members were scheduled to vote in September 2004 on a revised core data set; an implementation guide has also been developed. Proponents hope to see the CCR in regular use thereafter, as sponsoring organizations promote it with their members and vendors are encouraged to build in CCR capability. In addition to improving the speed, accuracy, and completeness of clinical information exchange, CCR

champions expect it to "achieve many of the short-term goals and benefits of the envisioned EHR," serving as a "more practical, more immediately achievable, interim alternative."[34]

Personal Health Record

The principle of giving a patient greater access to his or her own medical record and a means of secure electronic communication with his or her physician underlies the concept of the personal health record (PHR).[35] Rather than a passive history such as one might record in a notebook, the PHR is understood by its proponents as a tool to help patients take a more active role in their care. A PHR can begin as a stand-alone proposition or as a component of an EHR; the latter, supporters feel, is preferable in the long run so that all those involved in a person's health care (including the individual, family, clinicians, and ancillary providers) are working from the same set of records.

A PHR is a tool to help patients take a more active role in their care.

A patient-access and communication module is available in some already-operating EHR systems. For example, Epic Systems' MyChart® module has been implemented by Geisinger Healthcare System, The Cleveland Clinic, Group Health Cooperative (South Central Wisconsin), and the Palo Alto Medical Foundation (PAMF), among others. As Geisinger describes it, MyChart provides a secure, HIPAA-compliant Web site where patients can view their EHR and exchange secure e-messages with their doctor's practice. It permits patients to see lab results, obtain immunization records, schedule appointments, look up medical information by symptom or diagnosis, renew prescriptions, and ask for referrals. Some organizations offer registration and access to these services for free; others charge a monthly fee.

PHR products are available to individuals through some commercial health care Web sites. Through WebMD, for example, a person can register for Health Manager, an interactive service that offers medical information, structured personal record storage and analysis (for example, graphing blood sugar level), alerts and reminders, and other tools. It can be set up to provide secure communication between patient and doctor if both agree.

Research conducted by the Foundation for Accountability (FACCT) revealed considerable support for the PHR concept. Researchers observed that the highest and most urgent level of interest in the PHR was on the part of the chronically ill, frequent users of health care, and people caring for elderly parents.[36]

In line with an earlier recommendation from the NCVHS, one of the four priorities of the *Framework for Strategic Action* is to personalize health care, in part by encouraging the use of PHRs. One strategy for doing so is the Medicare Beneficiary Portal, slated to be tested in an Indiana-based demonstration project. Initially the portal will provide access to fee-for-service

claims information; later, CMS hopes to add prevention information and reminders to schedule medical appointments.[37]

PHR enthusiasts have suggested that a foundation, government agency, or public-private collaborative entity might develop and standardize a basic PHR that could be mass-distributed on compact disc. The Secretarial Summit's Personal Health Record Track working group called for the development of mechanisms for access to personal health records that ensure equitable access "across diverse platforms and in diverse environments, recognizing the wide range of technical knowledge and skills and information self-efficacy across the U.S. population."[38]

CONCLUSION

Enthusiasm and momentum are running high among health IT planners. Reports of new evidence or optimism about the impact of EHRs on quality seem to surface almost daily. For example, Agency for Healthcare Research and Quality researchers have given tracking/reminder systems an A grade for effectiveness in improving the quality of care to racial and ethnic minorities.[39] The Nebraska Medical Center has begun offering its cardiology and internal medicine patients free, updatable CDs of their medical records.[40] Senators Bill Frist R-TN) and Hillary Clinton (D-NY), in a joint *Washington Post* op-ed piece, invoked an "emerging bipartisan consensus" around health information technology.

Still, in all this there is a certain element of preaching to the choir. Those who love IT do their best to adopt it. Those who are indifferent or even opposed, like the *American Medical News* contributor who cited interference, intrusiveness, and dismal failure as EHR drawbacks, thus far remain unmoved.[41] Many observers hope, or indeed assume, that resistors will become converts as a business case develops and practice norms change, but the tide has not yet turned.

As discussed above, the reasons for physician resistance may be as compelling as those in favor of EHRs. In particular, objections to the notion that a physician should invest in IT in order to reduce his or her own income by saving money for someone else are not easily countered. Aligning financial incentives to encourage quality remains a policy challenge—and also, many would argue, an imperative. Federal leadership also seems to be key. There are so many moving parts in a nascent health information infrastructure that it is difficult to imagine spontaneous harmony. Consensus is much to be desired, but its pursuit can also lead to delay if not stalemate.

In the end as in the beginning, the test for EHRs is their contribution to the vision of safer, higher-quality, more efficient care for all. No one quarrels with the vision. The challenge for EHR supporters is finding the route to broad acceptance that IT is a fundamental part of bettering health care.

Aligning financial incentives to encourage quality remains a policy challenge.

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