

Promoting Health Information Technology: Is There A Case For More-Aggressive Government Action?

There are sufficient reasons for the federal government to invest now in policies to speed HIT adoption and accelerate its benefits.

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ABSTRACT: Health information technology (HIT) could save \$81–\$162 billion or more annually while greatly reducing morbidity and mortality. However, gaining these benefits requires broad adoption, effective implementation, and associated changes in health care processes and structures. The policy options that could speed the adoption of HIT and the realization of these benefits include incentives to promote standard-based electronic medical record (EMR) system adoption; subsidies to develop information-exchange networks; and programs to measure, report, and reward performance. Investments in these and other identified policy options should pay for themselves while also laying the foundation for needed transformation of the U.S. health care system.

THE U.S. HEALTH CARE SYSTEM IS IN TROUBLE. Health cost inflation and population aging are projected to create unsustainable federal deficits. Employers, state governments, and individuals face similar financial pressures as health costs continue to increase faster than incomes. Despite investing more than \$1.7 trillion annually in health care, the United States has a large uninsured population and serious problems with inefficiency and poor quality. But health care providers are poorly equipped to address this growing crisis. Most lack the information systems for keeping up with the explosion in new medical knowledge, coordinating care with other providers, monitoring compliance with prevention and disease management guidelines, measuring and improving performance, or supporting efforts to rapidly detect and respond to public health emergencies. In the future these problems will be compounded by demographic shifts, increasing chronic disease caseloads, and shortages of professional staff.

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In 2003 RAND began a study to assess the potential for health information technology (HIT) to address these challenges. This paper summarizes the HIT policy implications of our findings and discusses the policy options that could be taken. A paper by Richard Hillestad and colleagues in this volume describes the results from our efforts to understand HIT-related benefits.¹

Study Data And Methods

Hillestad and colleagues describe the data, methods, and results from our analysis of electronic medical record (EMR) system adoption levels and potential HIT-related savings, costs, and health benefits. A more thorough explanation of our data and methods is included in an online appendix.² Our analysis of the diffusion rate and impact of information technology (IT) in other industries as compared with health care is found in a RAND publication by Anthony Bower.³ Three additional publications by James Bigelow and colleagues, Federico Girosi and colleagues, and Kateryna Fonkych and Roger Taylor detail the data, methods, and findings that support our online supplement and sections of this paper.⁴

We also collected information from textbooks, peer-reviewed literature, federal and industry publications, selected newspapers, and conference presentations. We discussed policy-related questions during our site visits to a wide range of leading HIT installations and in hundreds of discussions with thought leaders and experts in HIT and health care. We sought to define the current state of adoption, the barriers and enablers to adoption, issues affecting the use and effectiveness of HIT, the key elements that need to be in place to maximize the benefits of HIT, and the influence of current and potential policy on each topic.

We started with the evolving national HIT agenda, which included (1) the seven-point policy agenda recommended by the Institute of Medicine (IOM) in 1991 to promote widespread use of computerized patient records; (2) the eleven-point 2001 policy agenda of the National Committee for Vital and Health Statistics (NCVHS) to develop a National Health Information Infrastructure (NHII); and (3) the agenda of the Office of the National Coordinator of HIT (ONCHIT) in 2004 (the "Framework"), consisting of four goals and twelve strategies.⁵

Once the largest sources of HIT-enabled benefits and the key elements required to produce them were identified, we selected for consideration those policy options that appeared to have the greatest potential to directly lower barriers to these key elements or maximize HIT-enabled benefits. We also considered experiences with their use to date, interview and site-visit input, feasibility of administration, and degree of fit into a coherent national policy strategy.

Potential Benefits And Costs Of Effective HIT Implementation

As described by Hillestad and colleagues, after full adoption, \$81 billion or more could be saved annually through improvements in health care delivery efficiencies from using EMR systems.⁶ HIT-enabled improvements in prevention and disease

management could more than double these savings while lowering age-adjusted mortality by 18 percent and reducing annual employee sick days by forty million. Transaction efficiencies could add another \$10 billion or more in annual savings. Bower suggests that these potential savings could more than double again—to \$346 billion a year or more—if health care were transformed sufficiently to generate the relatively modest 1.5 percent annual productivity gains that were realized from IT-enabled efficiencies in the retail and wholesale industries.⁷

The costs of full adoption are low relative to these potential savings, averaging \$6.5 billion per year for inpatient systems and \$1.1 billion per year for outpatient systems during the adoption period. Our projected annual savings from improved efficiency, disease management, and prevention are nearly evenly divided between the 0–64 and 65-plus age groups, which suggests that Medicare and other payers have strong incentives to initiate policies supporting HIT adoption. Bigelow and colleagues found that the savings in the population age sixty-five and older depend in part on HIT-enabled prevention and disease management begun decades earlier, giving Medicare an incentive to promote HIT use in all age groups.⁸

Is The Market Working Well Enough Without Intervention?

Three key elements must be in place to enable these gains: widespread provider adoption of standard-based EMR systems, improved connectivity among providers and with patients, and a strong focus on improving quality and efficiency performance. Here we review the status quo for these key elements.

■ **Providers' adoption of standard-based EMR systems.** EMR systems provide timely access to patient information and integration of that information with order entry, decision support, and care-planning systems. They also serve as the data source and portal for communication with other providers, patients, and insurers, among others. Fonkych and Taylor found that 20–25 percent of hospitals and 9–12 percent of ambulatory practices have an EMR.⁹ Bower found that the EMR diffusion rate in health care is consistent with other complex, highly networked IT products in other industries and that that rate is accelerating as the market matures.¹⁰ Small and rural hospitals are moderately less likely to adopt, although size seems to be the significant variable. Hospitals with half or more of their patients on Medicare have 25 percent lower relative adoption rates. Not-for-profit hospitals have 50 percent higher relative adoption rates than for-profits. Ambulatory practices generally have lower adoption rates than hospitals, with larger practices and those affiliated with a hospital that has adopted being more likely to have adopted EMR systems.¹¹

Although we found major discrepancies in adoption by provider type and characteristic, the low levels of EMR system adoption mean that these discrepancies are not yet significant in an absolute sense—although they could become important later. Further analysis is needed regarding barriers to adoption in hospitals with high Medicare share and for-profit status, as well as about the unique issues associated with the lower adoption levels found in critical-access hospitals and

hospitals under contract management.

Major barriers to EMR system adoption include the cost of acquiring and implementing these systems, the slow and uncertain financial payoffs, and the high initial physician time costs.¹² Access to standards has improved, but concerns about compliance with standards and interoperability remain. The disconnect between who pays for and who profits from HIT is important. Providers pay in both acquisition costs and revenue losses from practicing cost-effectively. Bigelow shows, for example, that providers could be rewarded for eliminating 404,000 unnecessary deaths through HIT-enabled improvements in disease management and prevention with annual revenue decreases of \$51.7 billion for hospitals, \$11.6 billion for physician services, and \$13.5 billion for pharmacies.¹³ These same dynamics influence the development and use of personal health records (PHRs) and patient self-care technology. The result: low PHR adoption rates and a generation of PHR-like tools that are largely owned by the health care delivery system, rather than the ideal patient-centric PHR.¹⁴

■ **Connectivity and the use of HIT to improve performance.** Producing major HIT-enabled benefits requires more than installing an EMR. Effective connectivity is required to avoid redundant tests; improve safety and coordination among providers; increase administrative efficiency; and improve consumers' compliance with prevention, disease management, and care guidelines.

The major barrier to connectivity and the ability to systematically focus on performance is the low rate of EMR system adoption. Further, there is only negligible sharing of health information between existing disparate EMRs, partly because most EMRs were not designed with data sharing and interoperability in mind.¹⁵ Also largely lacking are information-exchange networks, without which there are few reasons for providers to convert to standards-compliant EMR systems or produce and share interoperable records. Finally, although many efforts are under way to improve quality, and individual providers have been quite effective in HIT-enabled performance improvement, the lack of widespread access to standardized patient care data or risk-adjusted performance reports severely hampers any communitywide effort to improve performance.

We identified four major market failures that perpetuate these barriers. First is the disconnect between who pays for and who benefits from HIT. Second is the lack of market pressure or incentives to adopt interoperable, standard-based HIT. Third is the lack of incentives, or even the presence of negative incentives, to be the first to invest in a community information-exchange network or to share detailed electronic patient data with competitors. Fourth is the absence of structure, incentive, or methodology to collect and report valid, aggregated, comparative data on providers' performance. In addition, early network developers face myriad other challenges, including organization and governance issues, lack of up-front funding and sustainable business models, technical issues, difficulty engaging practicing clinicians, and issues of patient privacy and legality.¹⁶

Is Government Interference In The Marketplace Warranted?

The president, the Department of Health and Human Services (HHS), other federal agencies, and now ONCHIT have provided valuable leadership, vision, and direction for HIT policy development. But should the federal government intervene in the marketplace to speed HIT diffusion and improve health care system performance? Bower found little empirically grounded research about how policy interventions change technology diffusion. He suggested that the argument for speeding up adoption must satisfy two conditions: (1) Adoption is better than no adoption, and (2) adoption today is better than waiting until tomorrow.¹⁷ The large potential savings from effective HIT implementation suggest that adoption is better than no adoption. The more difficult question is, Should government invest aggressively now, and by what mechanism?

EMR diffusion is accelerating without aggressive government intervention, although somewhat unevenly. But essential data sharing and interoperability across communities and with PHRs have generally been neglected, severely limiting the social benefits to be gained from that investment, further fragmenting health care, and creating additional barriers to the development of a future standardized system because of the high costs of replacing or converting nonstandard EMRs. The development of standard-based networks of interoperable EMR systems cannot be left to providers alone; they lack the capacity and the ability to appropriate the return on investment in such activities, despite the broader social usefulness of such activities.

The deepening U.S. health care crisis also demands action. Medicare's Hospital Insurance Trust Fund, for example, is projected to exhaust its assets in 2020, and it may take decades to realize HIT's long-term benefits.¹⁸ Girosi and colleagues project, however, that shorter-term efficiencies from EMR systems could save Medicare more than \$23 billion annually.¹⁹

Federal intervention can also be necessitated when major market failures threaten the public welfare. The market failures identified above impede development of the elements needed to generate HIT-enabled benefits. Externalities make it unlikely that these market failures will be resolved without policy intervention. But the reasons for federal intervention go beyond the government's role as market regulator.

As the custodian of the public's health and the largest employer and health care payer in the country, the federal government has a direct financial and fiduciary interest in acting to improve health care quality, efficiency, and equity. President George W. Bush recognized that responsibility when, in early 2004, he established the goal of nearly every American having an EMR within ten years.²⁰ We suggest that these are sufficient reasons to aggressively invest now in policies to speed HIT adoption and accelerate its benefits.

Are More-Aggressive Government Incentives Within Reach?

Sheera Rosenfeld and colleagues have described four types of potential HIT incentive arrangements: payment differentials for providers, cost differentials for consumers, direct reimbursements to providers, and shared withholds from providers.²¹ Based on our findings, we would add a fifth model: capitated or budgeted accountable delivery systems. We also identified a range of indirect or nonfinancial incentives that could promote adoption, including public information on the value of EMR systems and PHRs and disclosure of who is using this technology; group purchasing, open-source arrangements, or tax incentives that reduce adoption costs; EMR product certification or support organizations that decrease the risks associated with adoption; and public disclosure of providers' performance. Most of these approaches have been tested and proven effective.

We analyzed the cost, feasibility, and potential benefits of various incentive and subsidy programs. We assumed that pay-for-use incentives are designed to offset some of the costs of adoption or conversion, whereas pay-for-performance incentives are designed to share the value of HIT-enabled quality and efficiency improvements with the providers producing that value. We did not model pay-for-performance incentives, in part because there is too little experience and evidence with them to allow a modeling effort. If carefully designed for that purpose, such incentives should pay for themselves, despite potentially representing a much larger payout to providers than pay-for-use incentives. We suggest that further experimentation is needed to ensure that any national pay-for-performance program will successfully balance the goal of rewarding efficiency and quality while guaranteeing that benefits accrue to the stakeholders providing the incentive and to society. Specific incentive and subsidy modeling examples follow.

■ **Reducing the costs of effective EMR system adoption.** Girosi and colleagues found that any combination of financial or nonfinancial incentives that gradually reduces the costs of effective EMR system adoption by 50 percent over the next five years could increase the adoption rate, on average, by 14.7 percent per year over the next fifteen years, creating \$30 billion in added HIT-enabled savings.²² They estimated that a differential of \$3.20 per encounter for three years would cover the average costs incurred per office-based physician in the first three years of adoption (including one-time implementation costs, initial productivity losses, and maintenance costs, and assuming 3,000 encounters per year). For adoption costs to hospitals, including one-time and maintenance costs over a four-year implementation period, a midsize nonteaching hospital would require an estimated differential of \$81 per hospital bed day for four years (for a median 107-bed hospital, a mean four-year cost of \$5.5 million, and average occupancy).²³

The overall cost of such programs varies by how many providers qualify and the cost sharing required. For example, Girosi and colleagues simulated a program offering the 442,000 noninstitutional office-based physicians an incentive covering half of the cost of adopting (or converting to) standard-based EMR systems.²⁴ As-

suming that this program started in 2006, included a three-year window to begin adopting, and paid \$1.60 per encounter for three years, the projected cost of this incentive would be \$2 billion.

Based on our assumptions, half of the estimated 19 percent of physicians with older EMRs would likely convert to standards-based EMR systems during this three-year window. In addition, 22 percent of all other office-based physicians would likely adopt—37 percent more than would have without the incentive. The potential benefit-to-cost ratio for the program over fifteen years is 8.4:1. In the above short-term pay-for-use programs, our simulations suggest that they could pay for themselves by the time the incentive periods are over. And the sooner incentives are begun, the greater is their fifteen-year benefit-to-cost ratio.

■ **Direct subsidies for EMR system acquisition.** The cost of direct subsidies to providers for purchasing EMR systems will vary by the type of program and by the number and size of organizations subsidized. Giroi and colleagues predicted that a hospital at the twenty-fifth percentile of annual operating budgets (\$9.3 million) needs approximately \$2.9 million to cover 80 percent of the first four years' cost of implementation, whereas a hospital at the seventy-fifth percentile (\$77.1 million) needs approximately \$8.3 million.²⁵ The potential fifteen-year benefit-to-cost ratio for this subsidy is 5:1 if started between 2006 and 2008.

■ **Direct subsidies for network development.** Giroi and colleagues also projected the investment required to subsidize 100 percent of the costs of developing data-exchange networks in every U.S. county to be \$2.2–\$2.9 billion—a projection based on experiences in Santa Barbara County, California.²⁶ Experts suggest that these costs should be lower in systems that are more interoperable, using common networking standards and infrastructure and linking providers using standards-based EMR systems.

Policy Options To Speed HIT Adoption And Benefits

We have divided our selected policy options into three groups.

■ **Stay the course.** This group creates the information and infrastructure to support HIT expansion and includes many activities already under way or suggested in the early development phases of the Framework mentioned earlier. Included are the development and adoption of standards, common frameworks, HIT certification processes, common performance metrics, and supporting technology and structures. Also included is the aggressive use of federal purchasing power to promote HIT and interoperability, possibly including payment for qualifying e-visits, and the tracking and reporting of EMR system and network adoption patterns. Limited expansion of safe harbors to allow hospitals to subsidize community adoption of portable, standards-based EMR systems and information-exchange networks is also included, as are safe harbors that expand liability protection for providers who comply with federal privacy regulations while sharing confidential data through standards-based information-exchange networks and PHRs.

This group requires little or no new federal funding. It involves some legislative and regulatory changes, federal leadership, and formal recognition and selective expansion of existing private-public collaborative activities.

■ **Accelerate market forces.** This group includes targeted investments and incentives to overcome specific market failures, including a pay-for-use program for providers using standard-based EMR systems. It also includes creating (or contracting with) a national performance-reporting infrastructure to keep quality and efficiency measures current and to receive and report comparative performance data. Other initiatives include expanding use of risk- and gains-sharing contracts to promote delivery system accountability, and funding research, demonstrations, and policy development for pay-for-performance incentives. Finally, this group includes educating consumers about the value of HIT and conducting research on HIT-enabled methods to improve consumers' ability to manage their own health care.

These options require moderate initial investments in policy and infrastructure development, with larger investments for implementation over the following years. For example, pay-for-use programs require the development of incentive criteria, mechanisms to demonstrate standards compliance, payment levels, and administrative processes. Broad-based pay-for-performance programs require much more infrastructure-development work, including piloting and implementing performance metrics; establishing data collection, validation, and risk adjustment processes; and creating mechanisms for comparative reporting and payment. In addition, a critical mass of providers must adopt HIT and produce standards-based performance reports to support implementation of valid, risk-adjusted performance incentives. For a national program, this process will likely take many years.

Our modeling suggests that a short-term pay-for-use program could accelerate adoption and conversion to standards-based EMR systems, producing important benefits and a critical mass of users. Once the necessary infrastructure is in place, incentives to pay for standardized performance reporting and performance results could supplement or replace pay-for-use programs. This moving in stages with HIT incentives, from a focus on structure and process to process measures and outcomes, is similar to the evolution seen in quality improvement during the past twenty years.

Our simulations of this incentive program assume that every payer participates. But there is a strong case to be made for Medicare's starting the process. The Centers for Medicare and Medicaid Services (CMS) is both the nation's payment policy leader and the party with the most to gain. With leadership from HHS, the Office of Personnel Management (OPM) and other federal agencies could join with large-employer coalitions in following suit. Such a progression would send strong market signals for adoption, HIT's business case would improve, and the country would likely get the number of users needed to support further policy options. Eventually, when the clinical necessity of using advanced EMR systems and

decision support is firmly established, their use may become a reimbursable service. Likewise, HIT skills could eventually be required for professional licensure.

A few experts we interviewed suggested that EMR system usage might eventually be mandated for Medicare participation or indirectly mandated by requiring clinically detailed interactive claims or HIT-enabled performance reports. But such mandates without accompanying incentives—or federal incentive payments that are not exempt from Medicare's budget-neutrality provisions—are likely to meet strong provider resistance, disadvantage cash-poor providers, and decrease Medicare participation.

■ **Subsidize change.** This group would use targeted investments and subsidies to help overcome barriers and speed adoption. These options include grants to encourage the development of organizations, tools, and best practices to help HIT adopters and information-exchange networks succeed; and investments to accelerate PHR use, beginning with Medicare beneficiaries. Also included are grants and loans to support the start-up and early operations of information-exchange networks, and, potentially, direct subsidies to help selected providers acquire HIT.

Subsidies may be particularly important in overcoming barriers to network development. In addition to the market-failure issues and other challenges facing network developers, discussed above, much national policy and infrastructure work is needed. In response to a request for information, ONCHIT received strong industry support for developing the national health information network (NHIN). A collaborative response from thirteen major HIT industry groups calls for the development of regional health information networks, which would be autonomous centers of development and information transfer, but which, to ensure interoperability, would conform to a Common Framework of technical and policy requirements.²⁷ The Framework suggests that the requirements for complying networks, often called regional health information organizations (RHIOs), include interoperability with the federal health architecture, including disease surveillance systems. A collaborative response from eight leading services and technology companies envisions the need for a separate national corporation to provide the core services to operate the NHIN.²⁸

As these national standards and requirements develop, communities seeking to connect electronically may have little incentive to comply without the promise of federal or other external funding. Further, a Common Framework alone does not address the other challenges discussed above. Finally, because current federal policy does not call for unique patient identifiers, networking will be particularly dependent on providers' updating master patient indexes and linking and matching information to make it accessible through a Record Locator Service (RLS).²⁹

Gaining providers' support and convincing patients of the value and safety of networking confidential data will be critical. Overcoming these challenges requires ongoing investment in the Common Framework, standards and policy development, RHIO development, and programs to accelerate the adoption and net-

working of compliant EMR systems.

Long-term operational support for RHIOs could come from a variety of sources, including user fees. Support by employers and insurers for network operations and EMR system adoption could be increased by giving RHIOs a role in administering community-based performance improvement initiatives and a regional role in the national infrastructure for performance data collection and reporting.

This "Subsidize Change" group of policy options also includes possible direct federal grants and loans to help eligible providers acquire standards-based HIT. The Framework recognizes a special need to promote EMR diffusion in rural and underserved areas, and it reports that HHS is exploring how grants and contracts could be made available to regions, states, or communities for EMR adoption and health information exchange. Elements of this strategy to link subsidies for EMR system adoption and network development with support for organizations that facilitate local adoption and connectivity are found in multiple proposals. This linkage could help ensure that scarce subsidy dollars are used to fund integrated approaches to HIT implementation in communities making a commitment to change. Such facilitating organizations, possibly RHIOs, could help ensure that subsidies go to providers needing the most help and whose network participation would add the most value to the community.

We could not find sufficient evidence of inequities in care, because of a disparity in adoption rates, to warrant widespread direct government subsidies to disadvantaged groups. Although there are differences in adoption levels, it appears that business case and implementation issues have more influence on adoption than does poor access to capital. Implementing the policy initiatives discussed above should greatly improve the business case and decrease implementation risks. Expanded adoption and connectivity will also increase the network benefits from adopting; also, public reporting and the promise of incentives create competitive pressure.

Adoption data may suggest other policy initiatives. EMR adoption by physicians affiliated with hospitals largely follows facility adoption patterns, which suggests that a limited expansion of hospitals' ability to subsidize adoption and connectivity would increase HIT's reach. Academic medical centers are nearly twice as likely as others to have adopted—a useful trend that could be accelerated with differential incentives in graduate medical education (GME) funding. Capitated or budgeted integrated delivery systems have high adoption rates, which suggests policies to encourage delivery system accountability and risk/gain sharing. Larger clinics are much more likely than small offices to adopt, although new incentives and adoption support could narrow this gap, as could the growth of user-friendly Web-based and application service provider (ASP)-supplied EMR systems. Additionally, pressure to adopt, network, and report performance may stimulate new office practice affiliations.

Policymakers need better information on who is adopting, who is not, and what

motivates these decisions. Delayed EMR system adopters might simply be investing capital in technology with stronger market rewards, focusing on other imperatives, or waiting for costs or complexity to decrease or the business case to improve. We suggest that a federal program collect data on adoption, monitoring for policy effects and for inequities that could warrant targeted subsidies. Smaller physician offices and safety-net providers might, for example, lag further behind as adoption rates accelerate. However, any policy causing sudden dramatic increases in adoption could create untoward consequences, such as shortages in specialists, products, or supplies, as well as potential price increases.

Conclusions And Observations

Widespread adoption of EMR systems and related technologies, applied correctly, could greatly improve health and health care in the United States while yielding greater savings than costs. We have identified a range of policy options to speed the development of these HIT-enabled benefits. Our cost and benefit projections focused nationally, and our policy analysis focused on broad policy directions. We did not attempt to estimate return on investment for individual payers, provider types, or communities. Specific HIT-related cost and benefit experience will vary by stakeholder and local market dynamics, and further work is needed to understand the elasticity of demand and supply. Finally, who ultimately benefits from HIT-enabled savings will vary based on social policy context, insurance product and incentive designs, and health care delivery system structure; for example, some of these savings could be directed back into the health care system to cover the uninsured.

Given the enormous stakes involved and the uncertain effects of policy, Bower has suggested that the government proceed with incremental interventions and have rapid review of results and follow-on policy adjustments. The policy options discussed here could lend themselves to this approach. But the potential cost of not acting soon and aggressively must be considered. Since 1991 the IOM has repeatedly emphasized the pivotal role of HIT in enabling the transformation to a twenty-first-century health care system. We are now five years into that century.

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