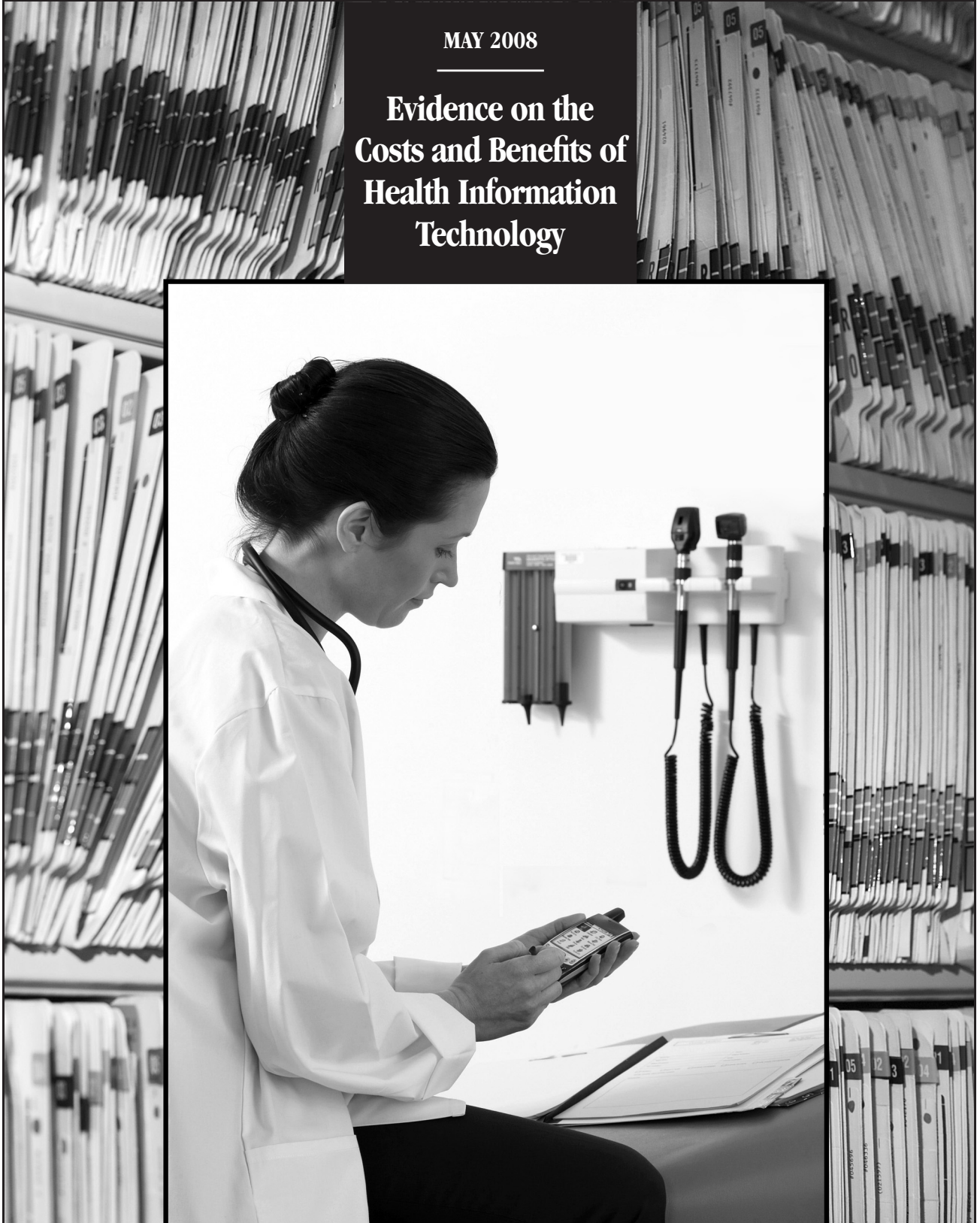


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**Evidence on the  
Costs and Benefits of  
Health Information  
Technology**





# Preface

**M**any people believe that health information technology (health IT) has the potential to transform the practice of health care by reducing costs and improving quality. In this paper, prepared at the request of the Chairman of the Senate Budget Committee, the Congressional Budget Office (CBO) examines the evidence on the costs and benefits of health information technology, possible barriers to a broader distribution and use of it in hospitals and clinicians' offices, and possible options for the federal government to promote use of health IT. In keeping with CBO's mandate to provide objective, impartial analysis, the paper makes no policy recommendations.

Stuart Hagen of CBO's Health and Human Resources Division and Peter Richmond, formerly of CBO, prepared the report under the supervision of Bruce Vavrichek and James Baumgardner. Keisuke Nakagawa provided able research assistance. The report benefited from comments by Tom Bradley, Robert Dennis, Keith Fontenot, Holly Harvey, David Moore, Robert Nguyen, Allison Percy, William Randolph, and Philip Webre, all of CBO. In addition, several briefings organized by the Health Information Management Systems Society provided helpful data. A number of outside reviewers also provided comments: Laura Adams of the Rhode Island Quality Institute, Mark Leavitt of the Certification Commission for Health Information Technology, David Cutler of Harvard University, Richard Hillestad of the RAND Corporation, and Douglas Johnston and Eric Pan of the Center for Information Technology Leadership. (The assistance of external reviewers implies neither responsibility for the final product, which rests solely with CBO, nor endorsement of the conclusions of CBO's analysis.)

Leah Mazade edited the report, and John Skeen proofread it. Maureen Costantino designed and produced the cover and prepared the report for publication. Lenny Skutnik produced the printed copies, Linda Schimmel coordinated the print distribution, and Simone Thomas prepared the electronic version for CBO's Web site.

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# Evidence on the Costs and Benefits of Health Information Technology

*The complexity of modern medicine exceeds the inherent limitations of the unaided human mind.*  
— David M. Eddy (1990)

## Introduction and Summary

Information plays a key role in health care. Providers such as physicians and hospitals generate and process information as they provide care to patients. Managing that information and using it productively pose a continuing challenge, particularly in light of the complexity of the U.S. health care sector, with its many different types of providers, services, and settings for care. Health information technology (health IT) has the potential to significantly increase the efficiency of the health sector by helping providers manage information. It could also improve the quality of health care and, ultimately, the outcomes of that care for patients.

The term “health IT” generally refers to computer applications for the practice of medicine. Those applications may include computerized entry systems for physicians’ ordering of tests or medications, support systems for clinical decisionmaking, and electronic prescribing of medications. (The appendix provides more information about the different types of health IT and the terminology used in the field.) Some or all of those components are housed in the electronic medical record (EMR). The electronic health record (EHR) is the primary health IT package commonly purchased by a provider. It is an EMR with the capacity to send and receive data electronically and meets the requirements for interoperability.<sup>1</sup>

When used effectively, EHRs can enable providers to deliver health care more efficiently. For example, they can:

- Eliminate the use of medical transcription and allow a physician to enter notes about a patient’s condition and care directly into a computerized record;<sup>2</sup>
- Eliminate or substantially reduce the need to physically pull medical charts from office files for patients’ visits;
- Prompt providers to prescribe generic medicines instead of more costly brand-name drugs; and
- Reduce the duplication of diagnostic tests.

The adoption and proper use of EHRs could also improve the quality of health care. Among other things, they could:

- Remind physicians about appropriate preventive care;
- Identify harmful drug interactions or possible allergic reactions to prescribed medicines, and
- Help physicians manage patients with complex chronic conditions.

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1. Interoperability describes the capacity of one health IT application to share information with another in a computable format (that is, for example, not simply by sharing a PDF [portable document format] file).
  2. Many physicians use voice dictation to document and report the results of examinations and procedures. Medical transcription is, in its simplest sense, the process whereby those dictated notes about a patient’s care are converted into a typewritten format.

**Box 1.****The Office of the National Coordinator of Health Information Technology**

The Office of the National Coordinator of Health Information Technology (ONC) manages the federal government's activities in two main areas: the development of standards necessary to achieve the interoperability of the large number of varying applications of health information technology (health IT) and the facilitation of information exchange.

**Developing Standards to Ensure Interoperability**

To establish processes for identifying standards with which health IT systems must comply and for certifying that the standards are being met, the Department of Health and Human Services (HHS), through ONC, set up the Health Information Technology Standards Panel (HITSP). The panel's overarching task is to promote interoperability in health care—the ability of systems and applications to communicate with each other. HHS also awarded a three-year contract to the Certification Commission for Healthcare Information Technology (CCHIT) to develop and evaluate certification criteria and create an inspection process for health IT.

As the standards process is currently set up, the HITSP develops industrywide health IT standards and recommends them to the Secretary of Health and Human Services, who first “accepts” them and then one year later officially “recognizes” them for use in federal health IT applications. (Such applications include those used by the federal government—for

example, in the Veterans Health Administration—and by federal contractors.) The panel uses the one-year period to refine the instructions given to vendors for complying with the standards. The standard-setting process is designed to minimize the number of unworkable standards that are issued rather than to maximize the speed with which standards are set. Private-sector health IT users are not required to comply with the federal standards; nevertheless, the federal standards have become the de facto industry measure for achieving interoperability.

Health IT vendors who wish to have their products certified as compliant with new federal standards can submit those products for examination by CCHIT. Certified electronic health record products should be able to communicate and operate with other similarly certified systems.

**Facilitating Health Information Exchange**

To ease the electronic exchange of health-related information, HHS funded the creation of prototypes for organizing the components of the National Health Information Network (NHIN). ONC describes the NHIN as a “network of networks,” built out of state and regional health information exchanges (and other networks) to link those various networks and the systems they in turn connect. The NHIN's mission is to develop a national capability to exchange standards-based health care data in a secure computer environment.

Many analysts and policymakers believe that health IT is a necessary ingredient for improving the efficiency and quality of health care in the United States. Despite the potential of health IT to increase efficiency and improve quality, though, very few providers—as of 2006, about 12 percent of physicians and 11 percent of hospitals—have adopted it.<sup>3</sup> An important question for policymakers, therefore, is whether—and if the answer is yes, how—the federal government should stimulate and guide the adoption of health IT.

The Bush Administration has set the goal of making an EHR available for most Americans by 2014. In 2004, it established the position of the National Coordinator for Health Information Technology in the Department of Health and Human Services to help bring about the broad adoption of health IT (see Box 1). Other federal agencies that finance health care or provide it directly have also taken steps to encourage adoption or to use health IT in their own clinical operations. Proposals before the Congress would expand the federal government's current activities by, among other things, mandating the use of some types of health IT, such as electronic prescribing (“e-prescribing”); offering financial incentives to providers who use health IT; and increasing the funds available for grants to purchase systems for providers.

This Congressional Budget Office (CBO) paper focuses on evidence about the benefits and costs of health IT and identifies and analyzes barriers to its adoption. Research indicates that in certain settings, health IT appears to make it easier to reduce health spending if other steps in the broader health care system are also taken to alter incentives to promote savings. By itself, the adoption of more health IT is generally not sufficient to produce significant cost savings.

The most auspicious examples involving health IT have tended to be connected to relatively integrated health systems. For example, Kaiser Permanente is a large integrated delivery system in which the health plan (primarily a health maintenance organization, or HMO) and the providers (physicians and most hospitals and ancillary

service providers) exclusively contract with one another to provide care to the health plan's enrollees. For such a system, reducing the number of unnecessary office visits (for patients' concerns or issues that could be handled to their satisfaction through telephone or e-mail consultations), for example, benefits the providers, the health plan, and the patients: It may lower the plan's costs for providing health care—and thus improve its “bottom line”—while minimizing inconvenience for patients. Kaiser has implemented a systemwide EHR in its facilities in some regions. In those areas, physicians have used such consultations to reduce the number of unnecessary office visits (compared with the number in regions without electronic systems).

A number of integrated delivery systems, including Intermountain Healthcare, Geisinger Health System, and Partners HealthCare, have also implemented EHRs across their organizations, and officials believe that as a result the systems have improved the efficiency and quality of the care they provide.<sup>4</sup> Some integrated systems have worked with health IT for decades. Intermountain Healthcare and the Department of Veterans Affairs (VA), for example, both began using computers to help manage clinical data in the 1970s. The VA has successfully implemented a systemwide EHR in a health care system that serves nearly 6 million patients in more than 1,400 hospitals, clinics, and nursing homes (Department of Veterans Affairs, 2008). According to the agency, its use of health IT has reduced its costs and greatly improved the quality of its care. (A recent Congressional Budget Office report [2007a] discusses the VA system in greater detail.)

For providers and hospitals that are not part of integrated systems, however, the benefits of health IT are not as easy to capture, and perhaps not coincidentally, those physicians and facilities have adopted EHRs at a much slower rate. Office-based physicians in particular may see no benefit if they purchase such a product—and may even suffer financial harm. Even though the use of health IT

3. Rates of adoption vary by the definition of health IT used in a particular survey. The rates given here are based on the adoption of health IT systems that include all or most recommended functionalities—such as electronic documentation of providers' notes, electronic viewing of laboratory and radiological results, electronic prescribing, computerized physician order entry, clinical decision support, and interoperability.

4. Those organizations differ from Kaiser in that they generally do not have exclusive contractual relationships with providers. In a typical integrated delivery system, providers are either salaried employees or operate in a close contractual partnership with the organization. Such a system often has a health plan that covers a substantial percentage of its patients but also treats patients who are insured through other, competing plans. Kaiser's exclusive contractual relationship with its providers is uncommon: The arrangement creates financial incentives that more closely resemble those of a staff-model HMO than of a typical integrated delivery system.

could generate cost savings for the health system at large that might offset the EHR's cost, many physicians might not be able to reduce their office expenses or increase their revenue sufficiently to pay for it.

For example, the use of health IT could reduce the number of duplicated diagnostic tests. However, that improvement in efficiency would be unlikely to increase the income of many physicians because laboratories and imaging centers typically perform such tests and are paid separately by health insurance plans. In cases in which a physician performs certain diagnostic tests in the office, reducing the number of duplicated tests would reduce his or her income. As a result, the capacity to avoid duplicating tests might not spur many physicians to invest in and implement a health IT system. Indeed, physicians might have a more powerful financial incentive to purchase additional office diagnostic equipment, for example, than to purchase a health IT system.

The search for improved efficiency in delivering health care has prompted numerous proposals for increasing the adoption of health IT. Two recent studies, one by the RAND Corporation and one by the Center for Information Technology Leadership (CITL), have estimated that about \$80 billion in net annual savings is potentially attributable to such technology. Those studies have received significant attention, but for a number of reasons they are not an appropriate guide to estimating the effects of legislative proposals aimed at boosting the use of health IT. To take the RAND study as an example:

- The RAND researchers attempted to measure the *potential* impact of widespread adoption of health IT—assuming the occurrence of “appropriate changes in health care”—rather than the *likely* impact, which would take account of factors that might impede its effective use. For example, health care financing and delivery are now organized in such a way that the payment methods of many private and public health insurers do not reward providers for reducing costs—and may even penalize them for doing so.
- The RAND study was based solely on empirical studies from the literature that found positive effects for the implementation of health IT systems; it excluded the studies of health IT, even those published in peer-reviewed journals, that failed to find favorable results. The decision to ignore evidence of zero or negative net savings clearly biases any estimate of the actual impact of health IT on spending.

- The RAND study was not intended to be an estimate of savings measured against the rates of adoption that would occur under current law, but rather against the level of adoption in 2004. That is, the researchers did not allow for growth in adoption rates that would occur without any changes in policy, as CBO would do in a cost estimate for a legislative proposal.

One significant potential benefit of health IT that has thus far gone relatively unexamined involves its role in research on the comparative effectiveness of medical treatments and practices. Widespread use of health IT could make available large amounts of data on patients' care and health, which could be used for empirical studies that might not only improve the quality of health care but also help make the delivery of services more efficient.

By making clinical data easier to collect and analyze, health IT systems could support rigorous studies to compare the effectiveness and cost of different treatments for a given disease or condition. Then, in response to the studies' findings, they could aid in implementing changes in the kinds of care provided and the way those services were delivered, as well as track progress in carrying out the changes. Such comparative effectiveness studies could lead to reductions in total spending for health care because of the tendency in the current health care system to adopt ever more expensive treatments despite the lack of solid evidence about their effectiveness. The likelihood of such reductions in spending could be increased if the studies' findings were linked to the payments that providers received or the cost sharing that patients faced, particularly if sufficiently strict cost-effectiveness thresholds were used (Congressional Budget Office, 2007b).

If the federal government chose to intervene directly to promote the use of health IT, it could do so by subsidizing that use or by imposing a penalty for failing to use a health IT system. From a budgetary perspective, the subsidization approach is less likely than a penalty to generate cost savings for the federal government because of the costs of the subsidies: Payments would end up going to those providers who would have adopted a health IT system even without a subsidy as well as those providers for whom the subsidy made the difference in their decision to adopt one. However, providers may respond differentially to a subsidy or a penalty depending on how those interventions are presented.