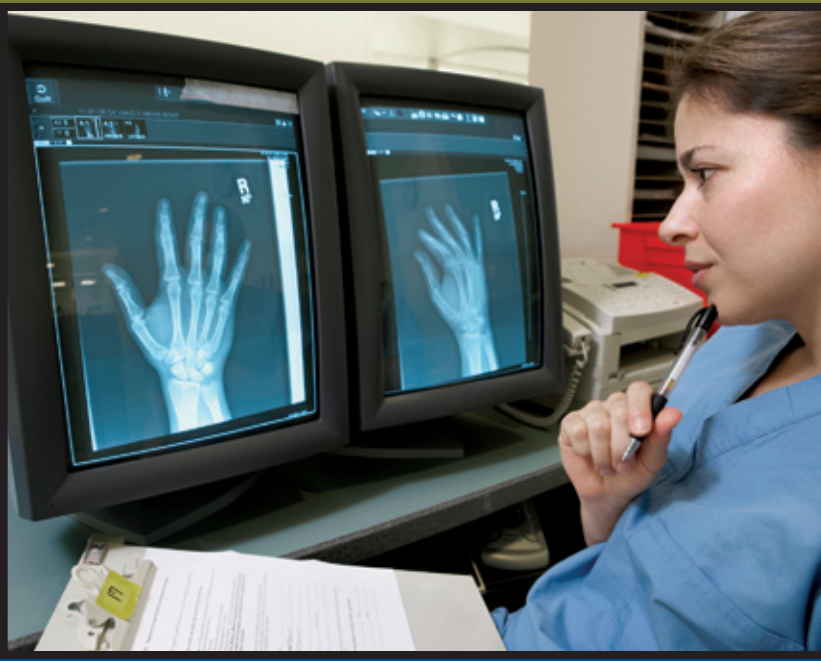
Health Information Technology in the United States:
Where We Stand, 2008



Executive Summary

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Robert Wood Johnson Foundation

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The Robert Wood Johnson Foundation focuses on the pressing health and health care issues facing our country. As the nation's largest philanthropy devoted exclusively to improving the health and health care of all Americans, the Foundation works with a diverse group of organizations and individuals to identify solutions and achieve comprehensive, meaningful and timely change. For more than 35 years the Foundation has brought experience, commitment, and a rigorous, balanced approach to the problems that affect the health and health care of those it serves. Helping Americans lead healthier lives and get the care they need–the Foundation expects to make a difference in our lifetime. For more information, visit *www.rwjf.org*.

About the George Washington University Medical Center

The George Washington University Medical Center is an internationally recognized interdisciplinary academic health center that has consistently provided high quality medical care in the Washington, D.C. metropolitan area for 176 years. The Medical Center comprises the School of Medicine and Health Sciences, the 11th oldest medical school in the country; the School of Public Health and Health Services, the only such school in the nation's capital; GW Hospital, jointly owned and operated by a partnership between the George Washington University and Universal Health Services, Inc.; and the GW Medical Faculty Associates, an independent faculty practice plan. For more information on GWUMC, visit *www.gwumc.edu*.

About the Institute for Health Policy

The Institute for Health Policy (IHP) at Massachusetts General Hospital (MGH) and Partners Health System is dedicated to conducting world-class research on the central health care issues of our time. The mission of the IHP is to improve the health and health care of the American people through conducting health policy and health services research, translating new healthcare knowledge into practice, informing and influencing public policy, and training scholars and practitioners of health policy.

Executive Summary

Health information technology (HIT), a subject that is much discussed by federal and local policy-makers and health care leaders, refers to a variety of electronic methods used to manage information about people's health and health care, on both an individual and a group level. An electronic health record (EHR) is the most commonly known example of health information technology. Electronic health records are intended to replace many of the health care functions now documented on paper, although EHRs can go beyond paper documentation and electronically collect, store, and organize information about individual patients, which can be used as the electronic equivalent of patient charts. Many health care experts promote the widespread adoption of EHRs because of the potential for far-reaching and beneficial effects on the delivery of health care services. EHRs could have a direct effect on provider and patient decisions at the point of care by providing necessary information about a patient's health and care history in a timely fashion. EHRs are also touted for their potential to yield a generation of richer, less expensive, and more relevant clinical information that could capture health care quality at the practice, organizational, and regional level. This type of data could serve a number of different purposes, like helping providers and patients better understand variations in health care quality, compelling providers to improve, and allowing patients to choose high-performing health care practitioners and organizations.

Our inaugural report in 2006, *Health Information Technology in the United States: The Information Base for Progress,* examined the barriers to widespread HIT adoption and the challenges related to accurately measuring HIT adoption in the United States, and made recommendations for improving existing, ongoing national surveys and for new surveys. This report expands on those efforts, reporting new survey data from general physicians and from those serving vulnerable populations, while exploring methods to evaluate the effect of these technologies on the cost and quality of health care.

This report builds on our previous work, initiated by the Office of the National Coordinator for Health Information Technology (ONC) in 2006, to design and deploy standardized measures of EHR adoption for use in national physician surveys. This report is funded by the Robert Wood Johnson Foundation (RWJF).

The Foundation has a long-standing commitment to understanding and improving the quality of health care for all Americans. This mission includes several efforts designed to address this country's current quality problems, including disparity of care for racial and ethnic minority groups. RWJF seeks to advance understanding in the health care field about the potential for HIT to help improve health care and to share what is known and not known about the rate of EHR adoption.

Chapter 1: Introduction

Chapter one summarizes the basic structure of the report. It briefly reviews the purpose of the report and its major content areas. In addition, this chapter introduces the research team and expert consensus panel.

Chapter 2: Scanning the Health Information Technology-Related Policy Environment

Chapter two provides an overview of important developments in health information policy and health information technology research that have taken place since the publication of *Health Information Technology in the United States: The Information Base for Progress in 2006*. These developments fall into two categories: policy-relevant research and policy developments related to HIT and its diffusion.

Key findings:

- A national survey of physicians conducted by the HIT Adoption Initiative estimates that 4 percent of physicians have a fully functional EHR, based on the definition reported in the 2006 report *Health Information Technology in the United States: The Information Base for Progress*. An additional 13 percent of physicians have a basic EHR.
- Having an EHR was significantly associated with several individual and practice characteristics. Fully functional and basic EHRs were more commonly reported by primary care physicians, those in larger practices, younger physicians and those practicing in the Western region of the United States.
- Three other high-quality surveys of physicians were conducted in 2007. These surveys suggest that adoption of EHRs in the ambulatory setting is continuing to increase when compared to prior years. There were no highly reliable surveys of hospitals conducted during the same time period. Nevertheless, the hospital surveys that were conducted also suggest that adoption rates are increasing.
- Despite an overall increase in the rate of EHR adoption, the adoption gap between small and large practices and hospitals continues to widen.
- A significant proportion of physicians reported that they had either purchased but not yet implemented an EHR, or planned to acquire one within the next two years. This would suggest that we may be at the upward inflection point of a classic S-shaped (sigmoid) adoption curve for a new technology.
- The failure to find a significant association between EHR use and improved quality of care suggests that: a) better measures for EHR use and/or quality of care are needed; and/or b) the quality benefits of EHRs occur later in the process of adoption; and/or c) the quality benefits of EHRs have been overestimated.
- The effects of the recent enactment of an HIT-related exception to the physician anti-self-referral statute (known as the Stark law), as well as the "safe harbor" from criminal and civil sanctions under federal anti-kickback laws on EHR adoption, are as yet unclear.
- The above regulations are of particular interest, because they appear to permit the private sector to selectively invest in the most profitable physicians. This has the potential to advance EHR diffusion in a manner that could result in widening racial, ethnic and socioeconomic disparities in health and health care.

Chapter 3: Are Physicians Serving Poor and Minority Patients Keeping Pace With EHR Adoption?

Chapter three examines the adoption of EHRs among providers serving vulnerable populations to determine whether these providers are adopting this technology at a slower rate than providers serving more affluent populations. To the extent that EHRs measurably improve quality of care, lower rates of EHR adoption among providers who serve a large proportion of low-income or minority patients could further exacerbate health disparities.

Key findings:

- To date, there is little evidence that providers who serve high numbers of poor, minority or other underserved patient populations are less likely to provide HIT-enhanced care.
- Nevertheless, virtually all available data document that the financial burden associated with purchasing, implementing and/or maintaining an EHR system is a major barrier to adoption among small and under-resourced subsets of providers who are more likely to serve poor, minority or other vulnerable patients.
- One strategy for tracking EHR adoption among providers serving vulnerable populations may be to use the characteristics of the neighborhoods where physicians practice (e.g., percentage of the population with income at or below the federal poverty level, percentage of the population that is non-English speaking) as a proxy for the demographic profile of their patient mix. In the absence of claims data or other reliable self-report measures, this could provide a more distal measure of EHR adoption among these providers. The analyses reported in this chapter did not find disparities in EHR adoption using this method. This may reflect equity in the diffusion of these technologies or that the socioeconomic status of local communities is not an optimal strategy for tracking HIT diffusion among providers who disproportionately serve minority or low-income patients.

Chapter 4: Consumers, EHRs and PHRs: Measures and Measurement

Chapter four reviews what is known about consumers' experiences with EHRs and personal health records (PHRs). While the federal government has developed guidelines to define and measure EHR adoption by physicians, physician group practices and hospitals, no such guidelines exist for the measurement of consumer access to and use of EHRs. This chapter reviews the available data and makes recommendations for future data collection efforts.

Key findings:

- PHRs range from *stand-alone* records created and maintained by individuals at one of the spectrum, to a tethered system where individuals have access to a provider-created and managed EHR at the other end of the spectrum. In the middle are models where one or more elements of the PHR and EHR might be *interconnected*. America's Health Insurance Plans (AHIP) estimates that approximately 20 percent of the U.S. population has PHRs. Conversely, Tang and colleagues estimate that only 1 percent to 2 percent of Americans actually have access to a PHR through applications such as Epic's MyChart.

- Surveys of the general public about their experiences with EHRs in physician offices also offer widely disparate estimates, with one online survey finding 16 percent of Americans reporting that "a doctor had ever used an electronic medical record to capture medical information" to 57 percent of Americans stating that their doctors use a "computer record system."
- While EHR use among physicians is growing, public surveys are conducted in a context where the vast majority of Americans have not directly encountered these technologies and thus their responses are only hypothetical.
- Studies of access to patient gateway systems suggest that patients using this technology are very satisfied with their systems. Patient gateways facilitate communication between patients and their practices over the Internet. Through these systems patients can request prescription refills, appointments and insurance authorization online. They can also send secure messages to the practice and access clinician-approved health information written in everyday language. However, these studies are limited in that they are restricted to patients at single health care institutions and the findings are not generalizable to the overall U.S. population.
- Those concerned with the potential for disparities in access to or use of PHRs by vulnerable populations will find a dearth of data to assess those issues. Most recently collected data do not show major differences by race or ethnicity. Consumer reports of EHR use by physicians vary by education and age; however, there is no consistent trend in the data.
- At present, there are insufficient national surveys with adequate sample size, response rates and high-quality content to allow valid, general estimates of PHR adoption or consumer experiences with EHRs in the United States. Most surveys lack consistent terms and definitions, leading to considerable variation in reported responses.

Chapter 5: Regional Health Information Organizations and Health Information Exchange

Chapter five reports on the latest efforts to advance electronic health information exchange (HIE) in the United States through regional health information organizations (RHIOs). The chapter examines data suggesting that HIE will have a substantial impact on health care system costs, saving approximately $80 billion annually, while reducing medical errors and improving quality. However, the widespread use of RHIOs faces several important obstacles.

Key findings:

- Many RHIOs are heavily dependent on grants from governmental and philanthropic organizations. This is likely due to the fact that most potential participants do not yet see enough financial value in HIE facilitated by RHIOs to invest in them.
- Major health care delivery organizations may not view participation in a RHIO as an optimal business strategy. Because these organizations have dominant positions in the market, they are unlikely to want to make it easier for patients to get care outside their system by making their clinical data readily available.

- Concerns about violations of the Health Insurance Portability and Accountability Act (HIPAA) and unauthorized access to patient data have slowed many HIE efforts.
- RHIOs face several technical challenges. Most U.S. health care providers do not have electronic health records, and those that have them encounter difficulties communicating with one another due to a lack of standards and interoperability. Further, the HIT systems used by other entities with clinical data, such as public health departments, pharmacies and radiology centers, must be configured to share data.
- Despite the challenges, a number of RHIOs are actively exchanging data and many more are in the planning phases. However, whether these organizations will become models for other RHIOs or whether each RHIO will need to find its own path to address specific needs of the community is not known.

Chapter 6: Emerging Privacy Issues in Health Information Technology

Chapter six examines the evolution of health information technology in a legal context, focusing on questions of privacy and security. Specifically, the chapter discusses the implications of the widespread use of these technologies on the privacy and security of the patient record.

Key findings:

- Because HIT has the potential to make health information far more accessible, it has become particularly important to maintain a focus on privacy and security considerations. Patient fears about improper disclosure of their health information may lead to "privacy protective behaviors" such as avoiding essential clinical or public health tests or treatments, or refusing to participate in important research programs.
- There has been a long-standing debate as to whether certain types of health information merit stronger protections than others. Some categories of health information should be given particular attention because of the high degree of harm that could result from unauthorized disclosures (e.g., mental illness).
- The HIPAA Privacy Rule represents the first and only national standard for protecting the privacy of individually identifiable health information in any format. It regulates the use and disclosure of personal health information (PHI) by "covered entities"–health plans, health care clearinghouses and health care providers who transmit health information. Under the provisions of this rule, covered entities may not use or disclose PHI except as permitted or required.
- There is a considerable, and highly variable, body of privacy law at the state level. Some states maintain comprehensive laws that apply to persons and entities that "collect, acquire, use or disclose information" within the state. Other state laws are targeted to certain diseases, types of information or populations, and public health or genetic information. This interstate variation in health information protection laws is among the most contentious issues related to the widespread adoption and exchange of electronic health information.
- Research suggests that the conflict between the federal Privacy Rule and state laws is extremely limited and may not justify undertaking a strenuous legislative effort to create a uniform, national privacy rule.

- Many entities that would be essential to the operation of a "national health information network" (i.e., health information exchanges, RHIOs, medical record banks) are not currently included in the Privacy Rule's definition of a covered entity. Without clarification of the responsibilities of these entities with respect to privacy, this stands as a significant impediment to a truly interoperable health information network.

Chapter 7: International Adoption of Electronic Health Records

Chapter seven reports on the state of HIT internationally and finds tremendous interest in these technologies globally. This chapter examines the different strategies used across nations to achieve high levels of EHR adoption in the ambulatory setting.

Key findings:

- The World Health Organization (WHO) and the European Union (EU) have begun surveying nations on their eHealth policies and programs. Seventy-two of the 112 countries participating in a 2006 WHO survey have established a national eHealth Policy, defined as "a framework and approach for developing eHealth in a country, established by government with the intent of achieving health goals."
- Several developed nations are approaching universal implementation of EHR systems, including Denmark, the Netherlands, Norway, Australia and New Zealand. Others, such as the United Kingdom and Germany, have made substantial progress.
- Few developing and transitional nations have made significant investments in or progress toward implementing HIT systems. This may reflect the fact that, for many developing and transitional nations, HIT is a promising solution for the future but is currently overshadowed by other, more pressing problems.
- The major factors driving adoption included governmental provisions of financial and non-financial support, standard setting, physician and medical society leadership, electronic billing mandates and peer influence.
- None of the above enabling factors were necessary for all nations and no nation used all of these enabling factors, suggesting that countries will need to tailor such incentives to their unique circumstances in order to achieve high levels of EHR adoption in the ambulatory setting.

Chapter 8: Economic Analyses of Health Information Technology

Chapter eight focuses on an economic analysis of health information technology. Specifically, this chapter identifies the theoretical and practical issues involved in executing economic analyses of EHR adoption, reviews the literature on economic evaluations of ambulatory EHRs, presents potential analytic strategies for an economic analysis, identifies promising types of data and data sources, and makes preliminary recommendations about the most effective and useful analytic strategy. Further, the chapter provides a framework that may be used to structure functionality-level analyses of EHR adoption.

Key findings:

- An examination of the existing literature on EHRs in the ambulatory setting shows that there has been tremendous variation in study design and data used.
- Economic evaluations of EHR adoption will have to take multiple perspectives (societal, provider, payer, etc.) to illuminate incentives and disincentives to adoption. Provider payment mechanisms (capitated vs. fee-for-service) influence what is considered a cost and what is considered a savings for a given entity.
- Estimating the value of future EHR adoption, based on the experience of those who have already adopted EHRs, should be done with care because early adopters will differ in important ways from later adopters.
- No ideal economic evaluation exists as of yet. Assessments conducted at the functionality level, the institution level and the community level each involve tradeoffs between the feasibility of data collection, the ability of the assessment to accurately capture the interaction of EHR functionalities and components, and the ability to accurately attribute specific economic changes to EHR implementation.
- The establishment of a reference case framework for analysis will improve the comparability of future studies.

Chapter 9: A Framework for Measuring the Effects of Health Information Technology on Health Care Quality

Chapter nine focuses on the challenge of measuring the quality impact of EHRs. This chapter examines the conceptual relationships between EHRs and quality of care, existing empirical evidence on the impact of EHRs on quality, and alternative approaches to measuring those effects in practice. Finally, we make recommendations for assessing the quality effects of EHRs, with the goal of providing guidance to future investigators interested in the health consequences of implementing EHR systems.

Key Findings:

- EHRs are neither necessary nor sufficient for high-quality care. Numerous examples of high-quality health care can be found in settings without EHRs. Conversely, studies of EHRs and their component functions have sometimes found no benefit or negative consequences.
- Most research on EHRs has been conducted at a relatively small number of locations, typically at urban academic medical centers that utilize "homegrown" EHR systems. Further, most of these studies examine the effect of single EHR functions on single clinical care processes, thus highlighting quality effects that may not be able to be generalized with other functionalities or processes. Finally, these studies have focused on a relatively narrow set of functionalities and outcomes.
- Several large-scale, prospective association studies of EHR implementation should be performed. While these studies are unlikely to meet all of the requirements of an ideal study, they could be conducted in a way that would provide more definitive assessments of EHRs' realizable effects on quality of care.
- Recommendations to ensure the policy relevance of future research on the relationship between EHRs and quality include:
- Measuring in multiple domains of quality;

- Measuring at the highest level of aggregation based on EHR functionality, rather than focusing on the effect of a single EHR functionality on a single care process or outcome;
- Encouraging the use of similar definitions of EHR functionalities across studies;
- Using measures that will be most sensitive to the effects we are likely to see;
- Using measures with a known relationship to population health;
- Investigating the requirements for and the potential to aggregate studies of specific functionalities across clinical domains or diseases (e.g., asthma, general prevention, screening, pneumonia);
- For association and cohort studies, controlling for crucial confounders;
- For vendors, encouraging the development of EHR capacity to measure its effects on care delivery; and
- Developing metrics to measure the ability of EHRs to affect the capacity for improvement.

This report was produced by a team of researchers at the Institute for Health Policy at Massachusetts General Hospital and the School of Public Health and Health Services at George Washington University: David Blumenthal, M.D., M.P.P.; Catherine DesRoches, Dr.P.H.; Karen Donelan, Sc.D.; Timothy Ferris, M.D., M.P.H.; Ashish Jha, M.D., M.P.H.; Rainu Kaushal, M.D., M.P.H.; Sowmya Rao, Ph.D.; Sara Rosenbaum, J.D.; Alexandra Shields, Ph.D.; Douglas Levy, Ph.D.; Richard Kwong, A.B.; Paola Miralles, B.S.; Julia Adler-Milstein; Melissa Goldstein, J.D.; Lee Repasch, M.A.; Sarah Johnson, B.A.; Thomas Isaac, M.D. and Vida Foubister, editor.

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