Innovating Healthcare Through
Health Information Technology (HIT) Infrastructure
by
Melissa K. Dobson
December 19, 2008

TABLE OF CONTENTS

ABSTRACT: *Government leadership plays a necessary role in encouraging the development and implementation of health information technology (HIT) where the people, as consumers of healthcare, need to be assured of the government's long-term commitment to HIT leadership. By strengthening cohesive and collaborative efforts nationwide to accelerate the use of HIT, efficient healthcare can be accessible for all. Though not all may agree with the fairness of the incentives offered for HIT integration, the absence of standards regarding contractual obligations, reasonable charges, disputes, and liability perpetuates the current lack of interest among parties for collaboration. The federal government can drive this cooperation, if not through executive leadership, then perhaps through the voices of the people as represented by Congress. The political power conferred via a federal entitlement program such as Medicare also can enable HIT innovation where the number one purchaser of U.S. healthcare services incentivizes health providers.*

Introduction

With the entry of innovative information technology in areas of healthcare delivery and consumption, computer systems in combination with communication technology have improved access to health information for both providers and consumers of healthcare. This new information technology, termed health information technology (HIT), enables a futuristic vision for healthcare and includes an electronic network of records and communications for an integrated approach to e-health. Initially, HIT holds potential promises to provide improved quality and efficiency in healthcare through standardized data networks to enable consistent healthcare delivery and consumption. Later, the focus shifts to drive improved health outcomes in an enhanced nationalized HIT system. Overall, HIT affords better, safer care for patients.

Financial and cost-efficiency measures through the use of HIT are highlighted since it is often necessary to work through existing health infrastructure in order to encourage participation, implementation, and enforcement of HIT system use. By bringing to light the potential advantages of HIT, increased opportunities may be realized in making the transition from paper-based medical records and electronic billing/coding to an e-health system of improved quality and efficiency metrics in overall American health.

Along the way, global HIT comparisons are made to gain insight into how HIT can potentially be implemented across the United States. A nationwide HIT system could eliminate the geographical discrepancies in care and treatment provided to patients. Furthermore, the following supplies some prospective resources and tools that have the capabilities of advancing HIT within the United States.

Understanding the Use of Health Information Technology Globally

Health IT could significantly increase the efficiency of healthcare by enabling providers to manage information.[1] By looking at a comparison with HIT systems already implemented globally, such as in the United Kingdom, the United States can realize the benefits, drawbacks, and considerations in moving forward to potentially create a national health information network. The promise of potential benefits has suggested that the federal government can and should support the nationwide adoption of HIT, yet research has indicated that incentives must be altered to promote savings.[2] Regardless of perspective, however, the United States can learn from HIT systems abroad to develop a strategy that has a nationwide common goal in providing HIT within the provider networks and/or concentrating on consumer demand.

The United Kingdom's Implementation of HIT

The United Kingdom of Great Britain & Northern Ireland comprises the countries of England, Scotland, Northern Ireland, and the principality of Wales, a population of 59.6 million people including:

1 England 49,805,700 (83.7% of total)
2 Scotland 5,057,400 (8.5% of total)
3 Wales 2,938,000 (4.9% of total)
4 Northern Ireland 1,702,600 (2.9% of total).[3]

While each country has a National Health Service (NHS), each also has its own approach to developing and implementing electronic health records (EHRs).[4] England's system described as follows provides a representative system of health information technology.

---

[1] Congress of the United States Congressional Budget Office. *Key Issues in Analyzing Major Health Insurance Proposals.* December 2008: 147.
[2] See Id.
[3] Nichloson, Lorraine. Electronic Health Records in the United Kingdom of Great Britain & Northern Ireland. Electronic Health Records (EHR) Conference, Amsterdam: June 12, 2008; http://www.ifhro.org/docs/EHRintheUnitedKingdomofGreatBritain&NorthernIreland/; *National Programme for IT in the NHS, Benefits Statement* 2006-2007; http://www.connectingforhealth.nhs.uk/about/benefits/ statement0607.pdf? (Accessed December 3, 2008).
[4] Id.

England   With a population of about 50 million, England's NHS has an overall budget for 2007/08 of £ 96billion (i.e. ~ $140 billion US dollars). As the largest employer in Europe and employing 1.3 million people, over 600 healthcare provider organizations and over 35,000 different treatment categories exist.[5] Therefore, National Electronic Health Records in England play a key part in the National Programme for Information Technology, a £6.2 billion programme supporting the delivery of the NHS Plan.[6] The patient-centered service offers more choices regarding time and location of treatment, and delivers "the world's biggest civil information technology programme."[7] British Telecom has a 10-year contract with NHS to run the NHS Care Records Service and provide the necessary infrastructure to enable healthcare information delivery.[8] While every NHS patient in England was originally expected to have an EHR in the system to date, current implementation and development of electronic infrastructure remains two years behind schedule.[9]

Specifically, every patient is assigned a unique national identifier for shared information access nationally.   The system provides safe, efficient and accurate patient records while maintaining privacy and confidentiality.[10] The EHR provides the details of key treatments and care within the healthcare and social services.[11] Information is mobile and connects more than 30,000 general practitioners and 270 acute, community, and mental health NHS trusts in a secure national system.[12] Detailed records get exchanged between providers while Summary Care Recods allow patients online accessibility to their health information using a secure website, "HealthSpace." [13] Thus, patients and NHS staff readily have the information they need to make quality care decisions.[14]

Scotland, Wales and Northern Ireland   Implementation efforts in Scotland, Wales, and Northern Ireland currently are underway as well. Wales has adopted a flexible incremental strategy to ensure the information system meets the needs of both providers and patients.

---

[5] Id.
[6] Id.
[7] Id.
[8] Id.
[9] Id.
[10] Id.
[11] Id.
[12] Id.
[13] Id.
[14] Note: Several detailed records are in place but may often be supplemented by paper records during implementation of electronic systems.

Scotland has taken a proactive approach to shift their delivery of healthcare to a model of "anticipatory, preventative and continuous care."[15] Consequently, Scotland and Northern Ireland both issued a notice on April 8, 2008 to purchase a patient management system worth between £ 30-120m over four years.[16]

Initiating e-Health in the United States

With the rapid introduction of electronic health records (EHRs) in hospitals globally, some other countries have started to pay attention to quality data and improvement as recognized through information technology.[17] The World Health Organization (WHO) has recently supported efforts to focus on electronic health (e-health).[18] Through training in medical records management, and ICD-10 classification and coding (known as the International Statistical Classification of Diseases and Related Health Problems, 10th Revision), coders and doctors seek to improve diagnosis recording and documentation of clinical notes in developing countries.[19] Though the U.S. may currently have an information system in place to track disease and manage geographic data through the Department of Health and Human Services (HHS), only recently has the Centers for Disease Control (CDC) begun to research ways to implement e-health.[20] Key areas, however, target public accessibility to health information, an overall population including providers and consumers of healthcare. These targeted networks include:

- Internet users
- Online health seekers
- Blogs
- Social Networks
- Podcasts
- eCards
- Mobile Users
- Text Messaging
- Mobile Video Users
- Online Video
- Tagging
- eGames[21]

---

[15] Id.

[16] Id.

[17] *Health Information and Evidence for Policy.* The Work of WHO in the Western Pacific Region, 2006-7: p.54-55.

[18] Id.

[19] Id.

[20] http://www.cdc.gov/healthmarketing/ehm/databriefs; Oct. 16, 2008.

[21] Id.

While these areas play key roles in the provider-patient interaction, and even suggest ways to educate the consumer of health services, the United States needs to initially strive to establish an e-health system of standardization and consistency for its provider networks. Though implementation for consumer access to e-health services simultaneously could provide potential opportunites in the delivery of healthcare, the focus of the following discussion lies in trying to understand the importance of e-health. Particularly, the following addresses how health information technology and the development of American health infrastructure has the potential to improve both quality measures of patient care and health services delivery, while also producing cost-efficient measures that importantly play a role in economic stability.

In 1996, the National Institutes of Health (NIH) established the Center for Information Technology (CIT) to provide information technology (IT) services.[22] As one of NIH's 27 Institutes and Centers (ICs), CIT's sole mission is to leverage information technology to service the other 26 ICs.[23] CIT offers innovative IT services to facilitate global communication and collaboration to support biomedical research including scientific computing, enterprise applications, hosting, network, video, podcasting, web collaboration, help desk, telecommunications, and other services.[24] CIT's strategic plan aligns with the missions, visions, goals, and desired outcomes defined by HHS and the NIH, but recognizes the necessity of integrating external policies and directives as defined by Congress and the Administration.[25] CIT's mission is "to provide, coordinate, and manage information technology, and to advance computational science to improve NIH's ability to discover new biomedical knowledge."[26]

Though national efforts towards e-health in the United States are on an upward trend, the United States has a future of growth and opportunity in health information technology (HIT) innovation. Intellectual property supporting areas of HIT has yet to be explored and implemented as the complexity of medical technology intertwines with healthcare services, health and technology costs, and a growing population.

---

[22] Jones, J.F. and Whitley, A.H. *CIT Strategic Plan 2007:* National Institutes of Health, Center for Information Technology, June 29, 2007; http://cit.nih.gov/NR/rdonlyres/9EBE6822-B585-4012-84E3-5F360C4C0EAC/0/CITStrategicPlan2007intranet.doc.
[23] Id.
[24] Id.
[25] Id.
[26] Id. at 3.3.

Defining Health Information Technology

Importantly, defining health information technology (HIT) and e-health systems facilitates initial discussion by standardizing some of the terminology as commonly utilized. Generally, HIT allows providers to collect, store, retrieve, and transfer information electronically, what translates into e-health and e-services.[27] As an emerging field in the intersection of medical informatics, public health and business, e-health actually refers to health services "delivered or enhanced through the Internet and related technologies."[28] In a broader sense, however, e-health encompasses not only technical developments, but also is a "state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally, and worldwide by using information and communication technology."[29] Thus, the "e" in e-health stands for "electronic", but also implies several other meanings.[30] As interwoven with discussions regarding HIT, and to specifically address the theme of e-health, integrating information technology into health infrastructure seeks to accomplish:

1) **Efficiency** in healthcare delivery: Increasing efficiency in healthcare may imply decreasing costs through a number of measures including reducing duplicative or unnecessary diagnostic or therapeutic interventions through enhanced communication between healthcare providers and patient involvement;

2) **Enhancement** in quality of care: E-health may enhance the quality of healthcare by allowing comparisons between different providers, involving consumers for quality assurance, and directing patient streams to the best quality providers;

3) **Evidence-based** interventions: Effectiveness and efficiency in healthcare should not be assumed, but rather proven by rigorous scientific evaluation;

4) **Empowerment** of consumers and patients: By making medical knowledge and personal electronic records accessible to consumers via the Internet, e-health expands the concept of

---

[27] See "Information technology in health care." Report to the Congress: New Approaches in Medicare. (June 2004) MedPac: 157-181, 159; http://www.medpac.gov/documents/June04_Entire_Report.pdf.
[28] Eysenbach, G. *What is E-Health?* Journal of Medical Internet Research: v.3(2), Apr-Jun 2001; http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1761894.
[29] Id.
[30] Id.

medicine and the delivery of health services to establish patient-centered medicine and evidence-based choice;

5) **Encouragement** of new relationships: E-health will enable a new relationship between patient and healthcare provider towards a partnership model of decision-making;

6) **Education** of physicians and consumers: Through online resources, physicians can pursue their continuing medical education and consumers can engage in health education, including preventative measures and lifestyle changes for better health;

7) **Enabling** information exchange and communication: Standardizing a system of health communication enables healthcare providers, institutions, and the consumer to interact in discussions for improved quality healthcare;

8) **Extending** the scope of healthcare: Geographically and conceptually, providers and consumers have a easier and more accessible route for healthcare delivery from simple advice to complex interventions (including telemedicine) or even managing pharmaceutical prescriptions;

9) **Ethical** interactions**:** New forms of patient-physician interaction posed new challenges to online professional practice, informed consent, privacy and equity issues;

10) **Equity** in access**:** People who do not have the money, skills, and access to computers and networks most likely cannot use computers effectively. Thus, these patient populations, who may benefit the most from electronic health information, are also the least likely to benefit from advances in information technology, *unless* political measures ensure equitable access for all. Currently, the inequity branches between rural v. urban populations, rich v. poor, young v. old, male v. female, and neglected/rare diseases v. common diseases.[31]

Discussions have remained challenging because of the lack of precise definitions, the volume of applications, and the rapid pace of technology[32] Administrative and financial systems utilize HIT for billing and accounting purposes.[33] Clinical systems utilize HIT to facilitate and/or provide input into the healthcare process.[34] HIT infrastructure that can implement both administrative and clinical applications can beneficially enhance the quality of care to patients as

---

[31] Id.

[32] "Information technology in health care." Report to the Congress: New Approaches in Medicare. (June 2004) MedPac: 157-181, 159; http://www.medpac.gov/documents/June04_Entire_Report.pdf.

[33] Id.

[34] Id.

well as facilitate cost-effective treatment studies that may foreseeably integrate into the delivery of health services. The following represents important terminology as commonly accepted:

- **Electronic Health/Medical Records (EHRs/EMRs)** act as electronic files for storing patient data from various sources including physician comments, nurse notes, laboratory orders and results, and prescription orders (with potential for integrating text, images, handwritten notes, etc.).[35] Current use implements the HER as an order-entry and patient-tracking system with real-time access to patient data and their continuous record of care.[36]

- **Computerized Provider Order Entry (CPOE)** typically allows medication to be ordered and fulfilled, including laboratory orders, radiology studies, procedures, discharges, transfers and referrals.[37]

- **Clinical Decision Support System (CDSS)** provides physicians and nurses will real-time recommendations for diagnosis and treatment; a variety of technologies included from alerts to prescription drug interaction warnings to clinical pathways and protocols (may be implemented as part of CPOE and EHR).[38]

- **Picture Archiving and Communications Systems (PACS)** captures, integrates, stores, and disseminates diagnostic and radiological images from various instrumentation including x-rays, MRIs, and computed tomography scans) to a medical record, clinical repository, or other point of care.[39]

- **Bar Coding** in healthcare is similar to that in manufacturing environments where an optical scanner electronically captures information encoded on a product (e.g. matching medication to a patient's arm bracelet), medical device, lab specimen, and/or radiograph.[40]

---

[35] Id. at 160.
[36] Id.
[37] Id.
[38] Id.
[39] Id.
[40] Id.

- **Radio Frequency Identification (RFID)** tracks patients throughout the hospital, and links lab and medication tracking through a wireless communications system, possibly as an alternative to bar coding.[41]

- **Automated Dispensing Machines (ADMs)** distribute medication doses.

- **Electronic Materials Management (EMM)** is utilized by healthcare organizations to track and manage inventory of medical supplies, pharmaceuticals, and other materials (similar to enterprise resource planning systems).[42]

- **Interoperability** refers to electronic communication among organizations to enable data in one IT system to be integrated into another; focuses on development of standards for content and messaging, and development measures for security and privacy safeguards.[43]

Table 1 provides examples of health information technology that may currently be utilized by hospitals and physicians, or may have the potential for use in these types of healthcare settings.

---

[41] Id.
[42] Id.
[43] Id.

Table 1: Examples of HIT.[44]

For Hospitals	For Physicians
▪ Administrative billing and financial general ledger ▪ Cost accounting systems ▪ Patient registration ▪ Personnel and payroll ▪ Electronic materials management ▪ Clinical computerized provider order entry for drugs/lab tests, procedures ▪ Electronic health record ▪ Picture archiving and communication systems for filmless imaging ▪ Results reporting of laboratory and other tests ▪ Clinical decision support systems ▪ Prescription drug fulfillment, error-alert, transcriptions ▪ Electronic monitoring of patients in intensive care units ▪ Infrastructure: desktop, laptop, cart-based, and tablet computers ▪ Servers and networks ▪ Wireless networks ▪ Voice recognition systems for transcription, physician orders, and medical records ▪ Bar-coding technology for drugs, medical devices, and inventory control ▪ Information security systems	▪ Administrative billing and financial accounting ▪ Scheduling ▪ Personnel and payroll ▪ Clinical online references (drug compendia and clinical guidelines) ▪ Receiving lab results and other clinical information online ▪ Electronic prescribing ▪ Computerized provider order entry ▪ Clinical decision support systems ▪ Electronic health record ▪ E-mail communication with patients ▪ Infrastructure: desktop and laptop computers ▪ Handheld technology ▪ Servers and network Note: Applications listed are examples and not exhaustive.[45]

In addition, HIT reporting requirements, through regulation and e-health could improve overall healthcare delivery. For instance, Health Maintenance Organizations (HMOs) and managed care plans set requirements for licensing physicians, pharmacists, nurses, hospitals, long-term care facilities, and ambulatory care clinics; they also implement medical malpractice regulations, medical liability rules, and medical error reporting systems.[46] Through these mechanisms, HIT could be integrated to ensure quality measures.[47]

As a research branch of the U.S. Department of Health and Human Services (HHS), the Agency for Healthcare Research and Quality (AHRQ) focuses on research of healthcare quality,

---

[44] Id. at 159.
[45] Id.
[46] *Health Quality & Health Information Technology*. National Governors Association; http://www.nga.org/portal/site/nga/menuitem.f5167288cdbd56cfcdcbeeb501010a0/?vgn
[47] Id.

costs, outcomes, and patient safety, complementing the biomedical research mission of the
National Institutes of Health (NIH). Particularly, HHS's value driven healthcare initiative
utilizes health IT for measuring and publishing quality information, measuring and publishing
pricing, and creating positive incentives for high-quality efficient healthcare.[48] Among the
National Quality Forum, Ambulatory Care Quality Alliance, National Committee for Quality
Assurance and Center for Healthcare Strategies (not-for-profit organizations to improve the
quality and cost effectiveness of healthcare), AHRQ has launched a new website to provide
healthcare professionals with measures used by federal agencies under HHS for reporting,
payment and quality improvement[49] The database includes metrics from the Administration on
Aging, AHRQ, Centers for Disease Control (CDC), Center for Medicare and Medicaid Services
(CMS), Indian Health, NIH, Office of Public Health and Science, and Office of the National
Coordinator for IT.[50]

---

[48] Id.

[49] *AHRQ Launches Quality Measure Database for Health Professionals.* HealthBeat; http://www.ihealthbeat.org/
Articles/2008/11/14/AHRQ-Launches-Quality-Measure-Data (Accessed Nov., 17, 2008).
[50] Id.

Health Infrastructure as it Exists in the United States

Total health spending in the United States reached $2.1 trillion in 2006, an amount equivalent to $7,026 per capita.[51] By 2016, total health spending is projected to rise to $4.2 trillion.[52] This accounts for more than twice as much per capita as countries in Australia, Canada, the United Kingdom, Germany, and Japan.[53] In addition, high health administrative costs in the United States have exceeded $111 billion (2003) and continue to grow at a rate of 11.2% annually; they are projected to double to $223 billion by 2012.[54] Though the economy typically depends on pricing to keep supply and demand in balance, when it comes to healthcare, efforts are not targeted as introducing policies that would implement consumer choice and slow spending.[55] As compared to national programs paid out of tax revenues, the complex U.S. health system integrates third-party systems (through private and public insurance) for payment of most health services.[56] Employer-based insurance is subsidized through income tax while the senior population and disabled are covered by Medicare.[57] Many poor are typically eligible for Medicaid or the State Children's Health Insurance Program (SCHIP), but some are left to purchase their own. For the 16% of Americans who cannot, they go without health insurance and pay directly (if even possible at some facilities), receive charity care, or go without care.[58]

Where the American healthcare system is not efficient in providing medical care for all Americans, it also does not have a consistent measure of quality care.[59] Serious quality problems in the American healthcare system include wide variations in recommended care across the United States.[60] (Schoen et al 2006). Some Americans are not even receiving the recommended

---

[51] Catlin, Aaron et al. (2008) "National Health Spending in 2006: A Year of Change for Prescription Drugs." Health Affairs, January/February 2008, p. 14; www.healthaffairs.org.

[52] Keehan, Sean, et al. (2008). "Health Spending Projections Through 2017: The Baby-Boon Generation is Coming to Medicare." Feb. 26, w145 (www.healthaffairs.org).

[53] "Health Care Costs: A Primer" Kaiser Family Foundation, August, 2007; http://www.kff.org.insurance/ upload/7670.pdf (Accessed September 18, 2008).

[54] Davis, K. and Cooper, B. S. of the Commonwealth Fund. "American Health Care: Why So Costly?" Testimony before the Senate Appropriations Subcommittee, June 11, 2003.

[55] Id. at 32.

[56] Id.

[57] Id.

[58] Id.

[59] Also note the racial and ethnic disparities and inequities in U.S. healthcare. Gamble, V.N., Stone, D., Ladenheim, K, Gibbs, B.K., et al. *Comparative Perspectives on Health Disparities.* Health Policy, Health Reform, and Performance Improvement. The Commonwealth Fund: v.39, April 26, 2006.

[60] Miller, Mark E. Report to the Congress: Reforming the Delivery System. (September 2008) MedPac. Washington, D.C., 2.

or the appropriate care.[61] Further, variations in healthcare delivery are not driven by differences in payment rates, but instead by *varying use* of services across the country.[62] *See* Figure 1 for a geographic distribution of healthcare access as utilized by patients across the United States within the last six months of a person's life (an exemplary illustration that depicts the disparities that exist in various areas of healthcare delivery and use).[63] Table 2 is a comparison of regional differences in spending, and the content, quality and outcomes of care.[64]

Figure 1: Geographic Distribution of Physician Visits.[65]

---
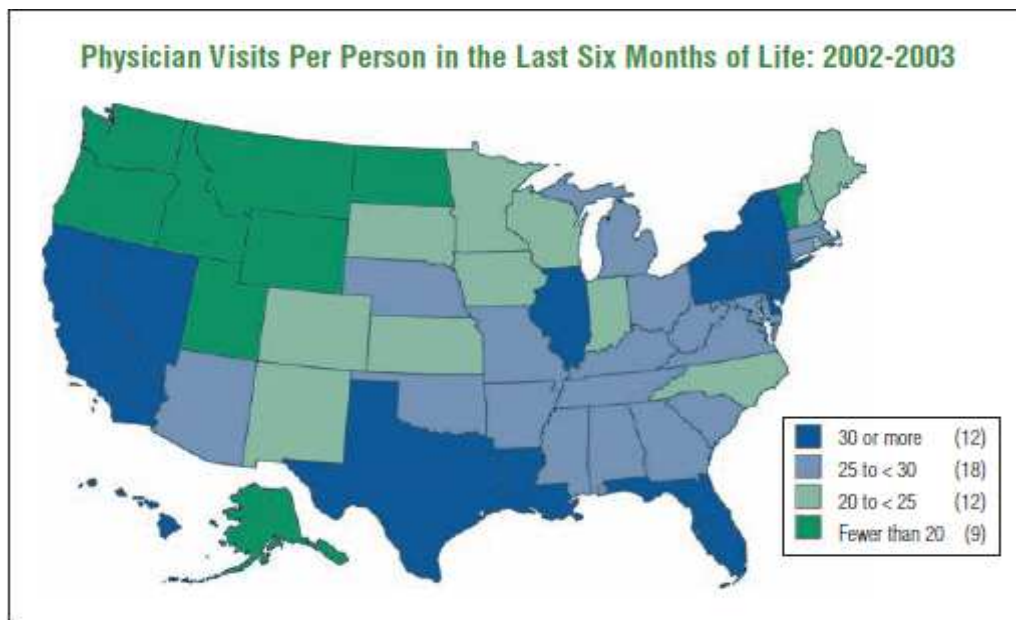
[61] Id.

[62] Id.

[63] Mahar, Maggie. *The State of the Nation's Health.* Dartmouth Medicine (Spring 2007), p.30; http://dartmed.dartmouth.edu/spring07/pdf/atlas.pdf.

[64] Wennberg, J.E., Fisher, E.S., Goodman, D.C., Skinner, J.S. The Dartmouth Atlas of Health Care 2008. The Dartmouth Institute for Health Policy and Clinical Practice: Lebanon, New Hampshire (2008), p.12; http://www.dartmouthatlas.org/atlases/2008_Chronic_Care_Atlas.pdf.

[65] Mahar, Maggie. *The State of the Nation's Health.* Dartmouth Medicine (Spring 2007), p.30; http://dartmed.dartmouth.edu/spring07/pdf/atlas.pdf.

Table 2: Dartmouth Studies Comparing Regional Differences in Spending; Content, Quality, & Outcomes of Care.[66]

	Higher spending regions compared to lower spending*
Health care resources [2]	• Per capita supply of hospital beds 32% higher. • Per capita supply of physicians 31% higher overall: 65% more medical specialists, 75% more general internists, 29% more surgeons, and 26% fewer family practitioners.
Content and quality of care [2, 3, 4]	• Adherence to process-based measures of quality lower (quality worse). • Little difference in rates of major elective surgery. • More hospital stays, physician visits, specialist referrals, imaging, and minor tests and procedures.
Health outcomes [1, 5]	• Mortality over a period of up to five years slightly higher following acute myocardial infarction, hip fracture, and colorectal cancer diagnosis. • No difference in functional status.
Physician perceptions of quality [7]	• More likely to report poor communication among physicians. • More likely to report inadequate continuity of patient care. • Greater difficulty obtaining inpatient admissions or high quality specialist referrals.
Patient-reported quality of care [5]	• Worse access to care and greater waiting times. • No difference in patient-reported satisfaction with care.
Trends over time [6]	• Although all U.S. regions experienced improvements in acute myocardial infarction survival between 1986 and 2002, regions with greater growth in spending had smaller gains in survival than those with lower growth in spending.

*High and low spending regions were defined as the U.S. hospital referral regions in the highest and lowest quintiles of per capita Medicare spending as in Fisher, 2003.[2]

According to Dartmouth Medicine's 2006 report, high cost regions boast 32% more hospital beds, 31% more physicians, 65% more medical specialists, 75% more general internists, and 29% more surgeons than low-cost regions.[67] Despite all these resources, however, outcomes are no better.[68] In the 1980s, critics of the research at Dartmouth failed to succeed in arguing that people in different parts of the country have different medical needs where it was determined that more intensive care was not driven by medical need, but rather by excess capacity.[69] In fact, supply is fueling demand in the Medicare system, within the Blue Cross Blue Shield insurance system, and throughout healthcare overall.[70]

Furthermore, a higher proportion of primary to specialty care physicians shows a greater utilization of services, but again is not associated with better outcomes.[71] As a result, the American healthcare system has failed to attain real progress toward restructuring quality and

---

[66] Id.
[67] Id.
[68] Id.
[69] Id.
[70] Id.
[71] Id.

cost concerns.[72] (IOM2001) In addition, diagnosis of patients may often be difficult, especially when patients present with multiple conditions or uncommon diseases[73] The choice of treatment may also be complicated where different patients respond differently.[74] Further, differing approaches may be taken for a difficult diagnosis; variations among locations and providers also contribute to how particular diagnoses are recorded.[75]

Take for example the Medicare variations in spending between a Miami patient and a patient in Minneapolis.[76] Medicare spending is 2 ½ times larger for the Miami patient, even after accounting for health and demographic differences between the two populations.[77] More aggressive treatment and higher spending levels did not result in better patient outcomes, the variability attributed to lack of efficiency in the health system as well as increasing costs.[78] Figure 2 illustrates the media's continued presence in representing these disparities.[79]

---

[72] Id.

[73] Id.

[74] Id.

[75] Id. at 35.

[76] Id.

[77] Id.; See Miller, Mark E. Report to the Congress: Reforming the Delivery System. (September 2008) MedPac. Washington, D.C., p.16.

[78] Id.

[79] Mahar, Maggie. *The State of the Nation's Health.* Dartmouth Medicine (Spring 2007), p.30; http://dartmed.dartmouth.edu/spring07/pdf/atlas.pdf.

Figure 2: Continued Media Coverage of Various Geographic Distributions of Healthcare.[80]

Without a solution or system to integrate quality measures as tied to outcomes in patient care, these trends will likely continue.[81] Perhaps, reconstructing the healthcare system within a conceptual understanding of e-health may therefore enable the integration and utilization of HIT.[82]

---

[80] Id. at 27.
[81] See Id.
[82] See Id.

The Health Spending Challenge and HIT Implementation

In the context of broader proposals to modify the healthcare system, expanding the use of HIT interacts with other systemwide changes.[83] For instance, a proposal to incentivize physicians through bonus pay for reducing the cost of chronic disease patients may encourage providers to adopt HIT systems.[84] In this case, HIT allows physicians to more effectively monitor patients and influence their use of care. Other changes could influence potential savings from HIT by focusing on cost and value of healthcare that is produced and consumed.[85] In addition, the potential benefits of HIT have not completely been realized, and therefore leaves open the role of HIT in research on the comparative effectiveness of medical treatments and practices. When clinical data is easier to collect and analyze, HIT systems will better support rigorous studies to compare the effectiveness and costs of different treatments for a given disease or condition.[86] Current payment structures, insurance programs, and billing practices contribute to the complexities in implementing HIT. To overcome these hurdles, it is important to understand some of the basic underlying components in health spending.

Payment Structures

The health spending challenge provides for a transitioning from the recognition of inefficiencies to a reduction of such without causing more harm than good.[87] Recognition of payment structures has determined that the customary fee-for-service (FFS) payment encourages greater resource use.[88] For instance, efforts underway have looked to data from multiple sources to better understand some of the inefficiencies. The data analyzed has included information from insurance claim records, patient registries, day to day medical interventions, comparative effectiveness studies, and scientific literature to determine treatment strategies that are most promising.[89]

---

[83] Congress of the United States Congressional Budget Office. *Key Issues in Analyzing Major Health Insurance Proposals.* December 2008: 150.

[84] Id.

[85] Id.

[86] Id.

[87] "Information technology in health care." Report to the Congress: New Approaches in Medicare. (June 2004) MedPac: 157-181, 159; http://www.medpac.gov/documents/June04_Entire_Report.pdf.

[88] Id.; Rivlin, A. and Antos, J. Eds. Restoring Fiscal Sanity 2007: The Health Spending Challenge. Brookings Institute Press: Washington D. C. 2007, p.84-85.

[89] Id

While trying to develop a uniform series of quality measures for each insurer to base its schedule of performance initiatives, then, pay-for-performance (P4P) has driven substantial payments to practices that score higher.[90] Coordinating the choice of measurements, as subjectively determined by individual providers, presents challenges for enhancing any quality or efficiency achieved.[91] Pay-for-performance has even been considered to significantly spur the adoption of IT by physicians if Medicare required or encouraged physician reporting of quality measures in electronic form.[92] This may lead to indirect savings in other areas such as reduction in the duplication of tests and decreased medical errors.[93] Physicians may then be encouraged to migrate to larger practices which possibly could have a positive impact on cost and quality, as driven by the market.[94]

With people over the past few decades having increased prosperity and an improved quality of life, they are living longer.[95] Advances in knowledge and technology have influenced the increasing effectiveness of medical care, but integration and wider use of technology has caused serious challenges.[96] Information technology, as it would be integrated today, is not excluded from this challenge.[97]

As an increasing portion of federal budget, health spending continues to be driven by the cost of federal health programs, particularly Medicare (an entitlement program for the elderly and permanently disabled) and also Medicaid (as provided for low-income Americans and supplemented by the state).[98] Health spending projections have grown much faster than anticipated federal revenues at current tax rates, the federal health spending estimated at about $676 billion in 2006.[99] Figure 3 below represents the proportion of healthcare expenditures,

---

[90] Id. at 85, 165.
[91] Id. at 165.
[92] Id. at 167.
[93] See Id.
[94] Id.
[95] Id.
[96] Rivlin, A. and Antos, J. Eds. Restoring Fiscal Sanity 2007: The Health Spending Challenge. Brookings Institute Press: Washington D. C. 2007.
[97] "Information technology in health care." Report to the Congress: New Approaches in Medicare. (June 2004) MedPac: 165; http://www.medpac.gov/documents/June04_Entire_Report.pdf.
[98] Rivlin, A. and Antos, J. Eds. Restoring Fiscal Sanity 2007: The Health Spending Challenge. Brookings Institute Press: Washington D. C. 2007.
 Id. at 2.
[99] Id. at 13; Office of Management and Budget, *Budget of the United States Government: Fiscal Year 2006* (Government Printing Office, 2006), Historical Tables.

particularly Medicare with 16% spending as a share of the Federal Budget in 2007 (including offsetting receipts).[100]

Figure 3: Medicare Spending Share of the Federal Budget, FY 2007.[101]
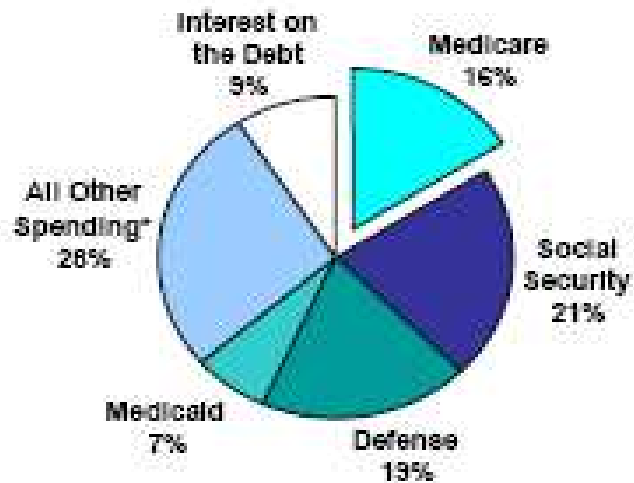
Medicare, Leading Health Expenditures

Medicare, as the largest single health insurance program in the United States, covers nearly 43 million beneficiaries, accounting for about 16% of the federal deficit and 23% of national spending on personal health services.[102] In 2006, Medicare benefit payments totaled $374 billion.[103] With the aging population, and the new drug benefit, net federal spending has been estimated by the Congressional Budget Office (CBO) to grow to $564 billion in 2012.[104] Medicare faces critical issues in financing healthcare for an aging population, particularly the more than 75% of Medicare beneficiaries with one or more chronic diseases who drive about 79% of program spending and account for more than 75% of the nation's $2 trillion in medical care costs.[105]

---

[100] Congressional Budget Office, *Monthly Budget Review*, Nov. 6, 2007.
[101] Id.
[102] Id.; Kaiser Family Foundation. *Medicare at a Glance.* November 2008.
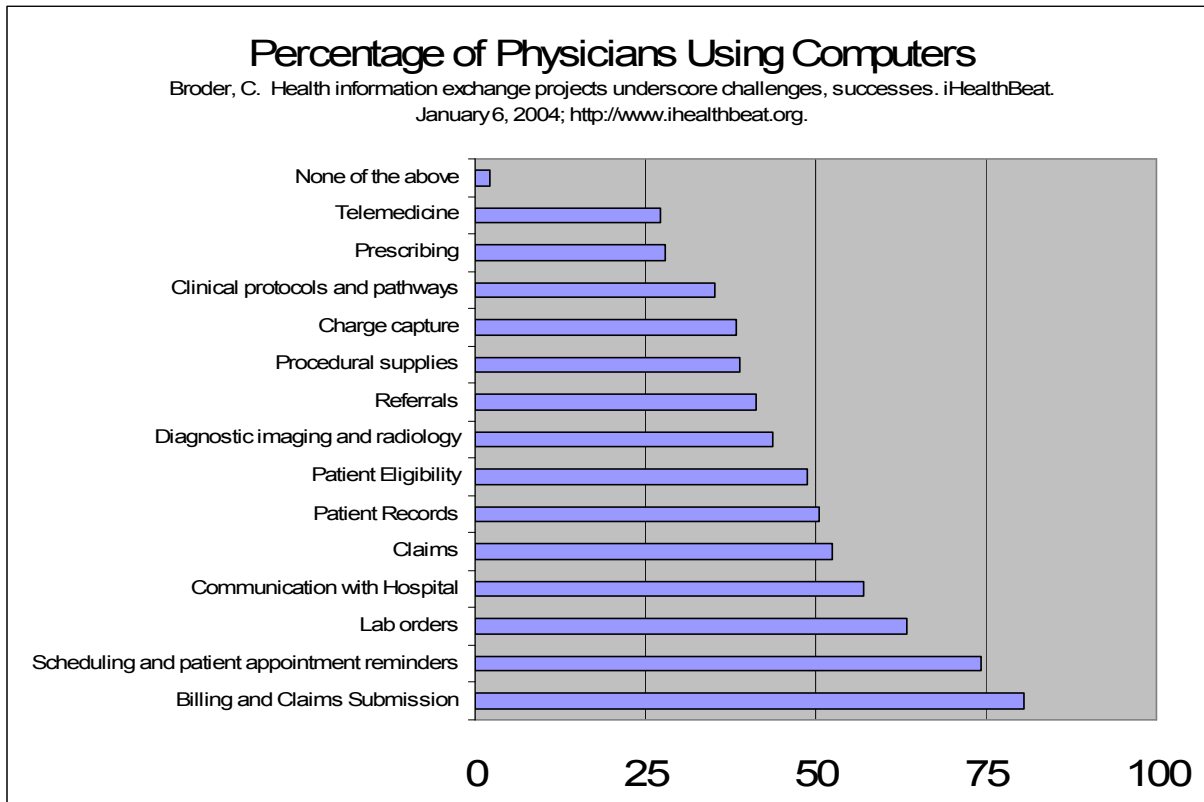[103] Medicare: A Primer. March 2007. Kaiser Family Foundation: p.13.
[104] Id. at 13; Kaiser Family Foundation. February 2007. *Medicare at a Glance.*
[105] Berenson, R. A. and Horvath, J. 2003. *Confronting the Barriers to Chronic Care Management in Medicare.* Health Affairs, 22: w37-w53; See also Center for Disease Control (CDC) 2008.

Interfacing HIT with Technology Development and Innovation

Health information technology (HIT) is currently utilized by a small percentage of physicians (*See* Figure 4) to record patient records, also known as electronic health records (EMRs), which provide mechanisms to collect information on patients, make notes on particular courses of treatment, and monitor and analyze overall patient progress. [106]

Figure 4: The Percentage of Physicians in the United States Using Computers as Compared to Functional Use of Computers within Healthcare Delivery Systems.[107]

Percentage of Physicians Using Computers
Broder, C. Health information exchange projects underscore challenges, successes. iHealthBeat. January 6, 2004; http://www.ihealthbeat.org.

The EMRs enable more reliable judgments about effectiveness of treatment and the value-added by providers.[108] Paperless medical records have improved quality of care in places such as Weston Center of Marshfield Clinic in Wisconsin which began deploying portable tablet

---

[106] Id. at 52.
[107] Broder, C. Health information exchange projects underscore challenges, successes. iHealthBeat. January 6, 2004; http://www.ihealthbeat.org.
[108] Id. at 52.

21

computers in 2003 to lead to a chartless medical environment by end of 2007. [109] As linked to the Clinic's EMR, the provider can access medical history, radiology reports, images, test results and expert opinions while also taking notes, entering orders, or writing prescriptions electronically in order to provide more organization and more efficiency in healthcare delivery.[110] In August 2008, nearly 90% of Wisconsin hospitals reported either partially or fully implementing five or more key HIT systems.[111] Nearly 40% reported a high adoption rate and a total of 76% reported moderate to high level of HIT use in areas of tracking delivery of medications to the patient, and computerizing laboratory and medical imaging results.[112,113]

Governmental programs for supporting HIT implementation have targeted Medicare because of its leadership in healthcare spending, delivery of services, and its low administration costs. Medicare data, incorporated into a national program with national claims database, and Medicaid [scattered] data offer rich sources of patient information for assessing clinical effectiveness and quality of care measures.[114] WorldVistA, a HIT system based on the Veterans Affairs Departments' e-records system (called VistA) provides another success story and support for government-developed HIT.[115]

Using VistA, the Veterans Affairs Department has improved nearly every benchmark in healthcare.[116] Within ten years, it has increased its pneumonia vaccination rate among at-risk patients to about 94%, up from 29%, thereby saving 6000 lives and saving $40 million each year from prevented pneumonia hospitalizations.[117] Through the utilization of beta blockers, cancer screening, and cholesterol screening, the Veterans Department has outperformed the nation's best care.[118] VistA costs per patient are actually 32% lower as compared to 10 years ago (using inflation-adjusted dollars), while the medical consumer price index has increased 50% for the

---

[109] Marshfield Clinic Health News: Electronic Medical Record Improves Health Care; http://www.marshfieldclinic.org/patients/?page=cattails_2005_sepoct_paperless (Accessed Nov. 17, 2008).
[110] Id.
[111] Grasmick, Mary Kay. Wisconsin Hospitals Invest in Health Information Technology. Wisconsin Hospital Association: Madison, WI. August 20, 2008.
[112] Id.
[113] In 2006, relaxed federal laws made it easier to allow hospitals to subsidize the cost of doctors buying software to maintain patients' e-records. A new study, however, reflects how barriers still remain to adopting new technology. Ward, Getahn. *Hospitals Take It Slow with Electronic Recordkeeping.* The Tennessean. (October 29, 2008); http://www.tennessean.com/apps/pbcs.dll/article?AID=/20081029/COLUMNIST0304
[114] Berenson, R. A. and Horvath, J. 2003. *Confronting the Barriers to Chronic Care Management in Medicare.* Health Affairs, 22: w37-w53; See also Center for Disease Control (CDC) 2008.
[115] Goetz, T. *Physician, Upgrade Thyself.* The New York Times. May 30, 2007.
[116] Id.
[117] Id.
[118] Id.

entire United States.[119] In fact, for the past eight years, the Veterans Health Administration has outscored private-sector healthcare in an independent American Customer Satisfaction Index.[120]

As an off-shoot from VistA, WorldVistA was formed in 2002 by a group of former Veterans Affairs programmers to extend the effort to the market.[121] In April 2007, the software was approved by the Certification Commission for HIT for broad adoption.[122] Subsequently, the Centers for Medicare and Medicaid (CMA), who set prices for the Medicare and Medicaid payments, have granted money to reward HIT efforts that provide clinics and public hospitals with such HIT systems, especially inexpensive systems using EMRs for uninsured and underserved patients.[123]

Billing Practices

Medicare, with 100% funding from the federal government, operates through regional carriers and intermediaries with access to billing, but without access to detailed patient records.[124] Medicaid, operated through state agencies, does not share detailed billing or patient care with other federal agencies such as the Department of Health and Human Services (HHS).[125] With difficulty combining data from Medicare and Medicaid, any desired information within paper records is not retrievable in a practical manner for such a large number of patients.[126] Medicare, as a leader in payment structure, however, makes it possible to construct a comprehensive patient-level database using Medicare data without waiting for the entire adoption of HIT nationwide.[127] A Medicare HIT system mandating particular standards and regulations for information technology implementation would allow HIT to serve as a powerful analytic tool – effective for large populations and tightly controlled protocols, while setting forth

---

[119] Id.
[120] Id.
[121] Id.
[122] Id.
[123] Id.
[124] Id.
[125] Id.
[126] Id.
[127] Id.

the best practices in medicine and healthcare.[128] The challenge is that these types of analytics may be difficult to achieve in an actual care setting.[129]

A federally supported HIT system, however, would enable an up-to-date analysis of treatment effectiveness through various areas of federally supported health delivery and insurance.[130] Despite legal, technical, and financial challenges, the federal government through insurance programs covering federal employees, federal retirees, veterans, and military personnel, has an opportunity to partner with private insurers and other health plans for developing comprehensive health databases.[131] The effectiveness and quality analysis then becomes assessable to researchers, health plans and insurers too.[132]

Bigger Hurdles in Implementing HIT

Improving quality, cost, efficiency, and effectiveness of the healthcare system lacks sufficient funding to enable all providers and healthcare networks to purchase and maintain the instrumentation and necessary infrastructure to support HIT. Even the systems that currently exist lack integration with other networks and most probably the capability through updated software and programming to actually accomplish the integration.[133] The Agency for Healthcare Research and Quality (AHRQ) has an annual budget of $300 million, but total federal outlays are miniscule as compared to total spending for such services.[134] With Medicare at the top of federal priorities, along with another entitlement program of Social Security Insurance, the federal government has the opportunity to take leadership in HIT. Despite the overall decline in the U.S. economy, the importance in sustaining a federal budget will place pressure on governmental reform in support of HIT to aid the fastest growing expenditure in the federal budget – Healthcare Entitlement Programs.[135]

---

[128] Id.

[129] Id.; Note: Medicare is specifically an acute care program. Where long-term care and chronic care conditions drive large healthcare expenditures, implementation of an HIT system in only the Medicare system would not be representative of an overall actual care setting which encompasses both acute and long-term care.

[130] Id. at 54.

[131] Id. at 53.

[132] Id.

[133] Id.

[134] Id. at 53-54.

[135] Id.

Global Healthcare: Facilitating 'Access to All' through HIT

A 2006 survey by the Commonwealth Fund indicated that nearly all doctors in the Netherlands and a vast majority of doctors in Australia, New Zealand and Britain utilize EHRs.[136] Another example includes Denmark which has a comprehensive HIT exchange that allows doctors to see all medical care and testing of a patient.[137] In a survey of 2,700 practicing physicians, as conducted by researchers at Massachusetts General Hospital, 4% of doctors had fully functional EHRs in place.[138] Across the United States, about 25% of office-based doctors are estimated to use EHRs.[139] This, however is a startling contrast to other industrialized nations.[140]

U.S. rationale for the discrepancies reason the high expense in purchasing and maintaining equipment, the inability to find a system to meet provider needs, and the rapid pace of technology.[141] Stronger national leadership would allow the United States to participate globally in HIT innovation. Not only do EHRs increase organizational management of patient files and records, but the use of the HIT through EHRs reduces the risk of medical errors and spares the expense of missing records and unnecessary treatments, particularly in hospitals.[142]

In addition, the problem does not necessarily lie in the lack of software, but rather that the software required for enabling preferred HIT capabilities do not come cheap.[143] According to a research study published in the policy journal, Health Affairs, the average cost of investment are at about $33,000 per doctor, not including another $1500 per month per doctor for HIT maintenance.[144] Though this may a huge multimillion-dollar experiment for hospital networks, it is out of reach for small clinics and private physician offices.[145] Thus, the high expense of proprietary systems, which may require a license fee and support contract, shifts attention to public-domain origins such as WorldVistA, a system costing about one tenth of a proprietary

---

[136] Id.
[137] *Our Pen-and-Paper Doctors*. The New York Times. June 24, 2008; http://www.nytimes.com/2008/06/24/opinion/24tue2.html?sq=Health Information technology.
[138] Id.
[139] Goetz, T. *Physician, Upgrade Thyself*. The New York Times. May 30, 2007.
[140] *Our Pen-and-Paper Doctors*. The New York Times. June 24, 2008; http://www.nytimes.com/2008/06/24/opinion/24tue2.html?sq=Health Information technology.
[141] Id.
[142] Goetz, T. *Physician, Upgrade Thyself*. The New York Times. May 30, 2007.
[143] Id.
[144] Id. at 2.
[145] Id.

system.[146] WorldVistA is constantly improving and building potential to be scaled up and down, with access by any provider, almost anywhere.[147] Though not perfect and requiring some refinishing, the WorldVistA system is customizable and provides a usable graphical interface.[148]

Since 1994, the Bush administration has talked of long-term plan for modernizing the nation's healthcare system with IT, including computerizing patient records and prescriptions.[149] As a result of the demonstrated increased productivity and cost savings in other global industrialized nations, as well as the improved quality in clinical decisions and communications between doctors and patients regarding long-term and preventative care, President George W. Bush called for widespread adoption of EHRs by 2014.[150] The investment would spread over a 5-year period to accomplish the transition.[151] In December 2005, the Department of Health and Human Services (HHS) awarded three contracts totaling $17.5 million to public-private groups to accelerate adoption of HIT and secure portability of health information across the United States.[152] The goal, however, seeks to implement the use of interoperable EHRs across the nation within ten years.[153]

As the largest purchaser of healthcare through Medicare and Medicaid, the U.S. government has the potential to utilize this market power to accelerate the transition to HIT and implement electronic patient records.[154] After Hurricane Katrina, HIT provided an apparent solution as medical records had to be reconstructed, often times from scratch.[155] The federal government then published rules allowing hospitals and others to donate HIT systems for e-health records to doctors, with one requirement that the information be **standardized** and **portable**.[156]

Politically, then, while every serious candidate for the White House has a healthcare plan, every serious information technology (IT) business has begun to consider the market for HIT.[157] Google and Microsoft are leading candidates for the Web as they continue working on plans to

---

[146] Id
[147] Id.
[148] Id.
[149] Id.
[150] Id.
[151] Id.
[152] Id.
[153] http://hitadoption.org/index.php?module=News&id=cntnt01&cntnt01actions=print&cntnt
[154] Lohr, S. *Government Wants to Bring Health Records Into Computer Age.* The New York Times. July 21, 2004.
[155] Id.
[156] Brailer, D. J. *Your Medical History, To Go.* The New York Times. September 19, 2006.
[157] See Lohr, S. *Google and Microsoft Look to Change Health Care.* Aug. 14, 2007.

enable people to make smarter choices through HIT.[158] Specifically, Microsoft entered into the consumer health market by offering free personal health records on Web.[159] In October 2007, after two years of building a team, the expertise and technology, Microsoft announced HealthVault[160] and its collaborations with potential partners including hospitals, disease-prevention organizations and healthcare companies.[161] Those who signed up with Microsoft included the American Heart Association, Johnson & Johnson LifeScan, NewYork-Presbyterian Hospital, the Mayo Clinic and MedStar Health, a network of seven hospitals in Baltimore-Washington area.[162] HealthVault includes free personalized health records and an internet based search for health queries, all secured in an encrypted database with individual privacy controls.[163]

Recently, the move toward HIT in the United States has been recognized through national attention to e-prescriptions. For example, the number of U.S. doctors writing at least some e-prescriptions has doubled in 2008 to more than 70,000, up from 35,000 last year.[164] The volume of filled e-prescriptions, electronic drug authorizations, has risen about 15% a month since August 2008 (a significant boost over the 5-8% increases recorded earlier in the year).[165] Although not absolutely certain to be the cause of this change, the federally supported Medicare program appears to be the incentive.[166] Beginning in 2009, the Medicare program will offer doctors who e-prescribe a 2% reimbursement bonus.[167] In 2011, reimbursement drops to 1%, and again to 0.5% reimbursement in 2013.[168] However, by 2012, those who stick to paper pads will see reimbursement cuts.[169] Though the Drug Enforcement Agency has restricted various narcotic painkillers to be e-prescribed, the benefits of e-prescribing are recognized in reducing the opportunity for error and minimizing dangerous drug interactions.[170]

---

[158] Lohr, S. *Google and Microsoft Look to Change Health Care.* Aug. 14, 2007.
[159] Id.
[160] http://www.healthvault.com/.
[161] Id.
[162] Lohr, S. *Microsoft Rolls Out Personal Health Records.* The New York Times. October 4, 2007.
[163] Id.
[164] Hamilton, David P. *Incentives at Work: e-Prescriptions on the Rise.* BNET Healthcare. December 16, 2008;
http://industry.bnet.com/healthcare/1000269/incentives-at-work-e-prescriptions-on-the-rise/ (Accessed 12/18/2008).
[165] Id.
[166] Id.
[167] Id.
[168] Id.
[169] Id.
[170] Id.

The United Kingdom's HIT Revisted

England's government has been contracting with IT firms to implement the National Programme for IT (NPfIT) within their National Health Service (NHS).[171] Their electronically implemented records provide insight for the United States to provide such system to the American people.[172] Their electronic medical records (EMRs) include a central data repository of patient information available to all healthcare providers.[173] Electronically scheduling appointments has first been granted to providers, and will later be assessible to patients.[174] E-prescribing allows prescriptions to be filled by physicians to flow to both the pharmacy and the Prescription Pricing Authority that manages payments.[175] Improved broadband communication networks facilitate communication across the NHS while working towards implementing the world's largest HIT system by 2010.[176] Funding for NPfIT includes $17 billion from the national government and funds from local authorities.[177] Current funding covers the cost of technology, but not the training and work process changes to implement HIT at the local level.[178] Though England expects significant improvements in efficiency and quality care, including decision support, real concerns for privacy and security measures remain.[179]

A Case Study of Japan's HIT

Japan has the world's highest proportion of people over 65 years of age and medical bills for this population increasing by about 1 trillion Yen (equivalent to ~ $10 billion U.S. dollars) each year.[180] Similar to the United States, healthcare costs are projected to rapidly rise with their increased aging population and simultaneous increased demand on health.[181] In response to these trends, the Japanese government has made HIT one of its top priorities in controlling public

[171] *National Programme for IT in the NHS, Benefits Statement* 2006-2007*;*
http://www.connectingforhealth.nhs.uk/about/benefits/statement0607.pdf (Accessed December 3, 2008).
[172] See Id.
[173] http://www.connectingforhealth.nhs.uk/ (Accessed December 3, 2008); *see* "Information technology in health care." Report to the Congress: New Approaches in Medicare. (June 2004) MedPac: 157-181, 166; See also Parliamentary Office of Science and Technology 2004, NHS 2004, Naik 2003, Dodge 2004.
[174] Id.
[175] Id.
[176] Id.
[177] Id.
[178] Id.
[179] Id.
[180] Shimada, Haruo and Kondo, James. *Japan HIT Case Study.* The National Bureau for Asian Research (NBR) Center for Health and Aging: Health Information Technology and Policy Lab (2007);
http://pacifichealthsummit.org/downloads/HITCaseStudies/Economy/JapanHIT.pdf (Accessed Dec. 6, 2008).
[181] Id.

spending on healthcare.[182] While HIT within individual institutions is growing rapidly, other
challenges remain in establishing an appropriate standardized approach to a national EHR system
and ensuring interoperability between the systems that currently exist.[183] Table 3 outlines some
of the lessons learned in the implementation of HIT in Japan.[184] Though integrating HIT into
current health infrastructure creates systemic complexity and an initial increased workload,
sufficient leadership can appropriately ease the transition of HIT implementation.[185]
Furthermore, customized systems do not necessarily provide better outcomes, and cheaper non-
customized systems can provide a useful alternative.[186]

Table 3: Japan's HIT: Implementing Infrastructure.[187]

HIT Implementation: Lessons Learned

Framework for Information Technology Infrastructure for Health	Matching IT to existing workflow creates complexity in system design and increases workload. It is essential to conduct organizational reform and transformation concurrently with IT adoption. Many failures have arisen due both to lack of leadership by hospital top management and to inadequate project management by system integrators.
EHR customization is not always necessary	Until recently, EHR systems were mostly customized. Cost pressures, as well as better understanding over time of hospital requirements, have led to an increase in non-customized EHR systems. The initial cost of non-customized EHR system installation is now less than one million Yen per bed.

For instance, in Tokyo, Japan, 130 million people have universal health coverage, the capitalist
country spending 50% less per capita on healthcare than the United States.[188] The Japanese
Ministry of Health, Labor and Welfare (MHLW) is exploring several initiatives to expand HIT
adoption, including mandates for electronic records of physical exam data and the use of

---

[182] Id.
[183] Id.
[184] Id.
[185] Id.
[186] Id.
[187] Id.
[188] Reid, T.R. *Sick Around the World.* PBS: Frontline. April 15, 2008;
http://www.pbs.org/wgbh/pages/frontline/sickaroundtheworld/.

electronic health smart cards, e-cards.[189] Since 2003, 35 million national health insurance e-cards have been issued with implementation of personalized medical files considered for 2011.[190]

Other Representative HIT Systems and Lack Thereof

Germany, Taiwan, and Canada have also enabled universal healthcare plans throughout their respective countries, though not all have established universal HIT systems to aid their reform.[191] National policies within each country set the stage for prioritizing efforts within the healthcare industry. For instance, Germany spent less that 0.5% of its healthcare expenditures on HIT in 2006. In Taiwan, however, a country that practically became rich at the turn of the century, the government consulted experts from around the world, like Taiwanese American health economist Tsung-mei Cheng to design a system of universal healthcare coverage.[192]

Taiwan's HIT Efficiency

Importantly, the uniform government healthcare plan in Taiwan achieves remarkable efficiency as it integrates HIT through the use of the smart card.[193] Every Taiwanese owns a smart card for access to medical care.[194] The doctor uses the patient's smart card like a credit card to examine the patient's medical history and medications.[195] The bill then goes directly to the government insurance office where payment is automated.[196] Patterns of care can be tracked through HIT which allows the government to set policy and enforcement measures.[197] As a result, Taiwan has less than 2% of administrative costs in healthcare delivery, the lowest in the world (as comparable to the Medicare system in the United States which also has 2% administrative costs). Overall, the Taiwanese system works a lot like Canada's national

---

[189] Shimada, Haruo and Kondo, James. *Japan HIT Case Study.* The National Bureau for Asian Research (NBR) Center for Health and Aging: Health Information Technology and Policy Lab (2007); http://pacifichealthsummit.org/downloads/HITCaseStudies/Economy/JapanHIT.pdf (Accessed Dec. 6, 2008).
[190] Id.
[191] Reid, T.R. *Sick Around the World.* PBS: Frontline. April 15, 2008; http://www.pbs.org/wgbh/pages/frontline/sickaroundtheworld/.
[192] Reid, T.R. *Taiwan Takes Fast Track to Universal Health Care.* NPR. April 15, 2008; http://www.npr.org/templates/story/story.php?storyId=89651916 (Accessed December 6, 2008).
[193] Id.
[194] Id.
[195] Id.
[196] Id.
[197] Id.; Here, in Taiwan, if a patient goes to a doctor/hospital more than 20 times/month, or more than 50 times within three months, then the HIT system tags the patient. The person will then get a visit from the Bureau of National Health Insurance to discuss their healthcare access. Furthermore, no one in Taiwan goes bankrupt because of medical bills.

healthcare system, or like the United States Medicare system, but with more benefits.[198] Drug benefits, vision care, traditional Chinese medicine, kidney dialysis, inpatient care, outpatient care, and many other services are provided since the system can monitor consumer access to healthcare and potentially implement other metrics for determining quality and efficiency.[199] Furthermore, no gatekeepers (such as primary physicians in the U.S. system) control access to specialists which keeps patient's happy with the delivery of healthcare without waitlists.[200] Although increasing costs of healthcare strain the Taiwanese system as well, Taiwan spends about 6.23% of its GDP on healthcare, as compared to Americans paying 16% of GDP on healthcare.[201]

Canada's Infoway

As established in 2006, Canada's Infoway Standards Collaborative provides support and sustainance to healthcare information standards throughout Canada.[202] As an independent, not-for-profit organization funded by the federal government, Infoway targets investment to more than twenty standards projects at an expense of about $33 million.[203] Another $20 million has been dedicated by Infoway to support the maintenance of the standards for Canada.[204] Standards life-cycle based services to vendors, to service delivery organization and jurisdictions, as well as to liaising with International Standards Development Organizations also gets funded by the federal government.[205]

In addition, Infoway jointly invests with every province/territory to facilitate the development and adoption of electronic health record (EHR) projects in Canada.[206] With security measures fully respecting patient confidentiality, clinicians and patients can be provided with the information they need to better support safe and efficient healthcare decisions to better

---

[198] Id.
[199] Id.
[200] Id.
[201] Id.; Note: Japan spends about 8% of its GDP on healthcare. To finance the national health insurance system, the government fund forces everybody to join in and pay.
[202] Canada Infoway Defines its Health IT Standards (September 29, 2008); http://www.infoway-inforoute.ca/en/News-Events/InTheNews_long.aspx?UID=342; See also http://www.infoway-inforoute.ca/en/WhatWeDo/SCOverview.aspx.
[203] Id.
[204] Id.
[205] Id.
[206] Id.

manage a patient's health.[207] Rapid access to this vital information fosters more modern and sustainable healthcare system for all Canadians.[208]

Consumer Aspects of HIT in the United States

Transforming the healthcare system into one that better meets American patients' needs must address the consistency in the delivery of care through timely, affordable, transparent, and interoperable processes.[209] These measures equate with an idea of quality and have the capability of assuring instant access to complete medical information.[210] The perception of implementing HIT conceptually addresses e-prescribing which requires fewer co-payments, as well as reduction in medical errors, lower inefficiencies, and elimination of duplicative testing.[211] Health IT provides consumers with the benefits of rapid information transfer as may be needed to effectively diagnose a patient, potentially define therapeutic interventions, outline discharge planning, and/or provide for disease management at home.[212]

The U.S. Dept of HHS estimates that health spending could be lowered by as much as 30% annually with the adoption of HIT.[213] Rising costs, out-of-pocket costs, and growing numbers of people contribute to health access issues whereby those with financial concern may be unable to access critically needed healthcare services.[214] To reduce financial barriers to care and access treatment more quickly, an interoperable HIT system to share health information can reduce unnecessary testing and lower copays, thus lowering costs and achieving better outcomes for patients.[215]

---

[207] Id.
[208] Id.; Australia is looking to the Canadian HIT system of standards to consider moving forward in this area of innovation.
[209] *Speaking for Consumers on Health IT.* Health Affairs: The Policy Journal of the Health Sphere: August 20, 2008; http://healthaffairs.org.blog/2008/08/20/speaking-for-consumers-on -health-it/.
[210] Id.
[211] Id.
[212] Id.
[213] Id.
[214] Id. at 2.
[215] Id.

U.S. Economic Health Policy & HIT Innovation: Medicare Leadership

Financial incentives for innovation have moved incredibly far in the past few years toward electronic systems of interoperability. Success in local and regional health information organizations (RHIOs) is accompanied by increased community involvement, and the development of public-private partnerships.[216] Recent Medicare demonstrations in selected communities have provided financial incentives to primary care physician practices using certified EHRs to improve quality.[217] Government funding, private funding,[218] and explicit enforceable policies have developed technical standards to enable rules of operation for HIT, while also assuring that online medical information is safe and protected through privacy measures.[219]

The Patient Advocate Foundation (PAF) is a patient-services organization that resolves access, preauthorization, coding and billing errors.[220] It provides assistance with expedited approvals to private and public healthcare programs while another organization, National Patient Advocate Foundation (NPAF) is a policy organization that seeks to improve access to healthcare through state and federal regulatory and policy initiatives.[221] NPAF also encourages a number of additional incentives to broaden national HIT infrastructure.[222]

The U.S. Medicare system, as the largest payer for public healthcare services in the nation, provides leadership in healthcare policy.[223] The potential of HIT to improve the quality, safety, and effectiveness of healthcare can be accomplished by utilizing the status of Medicare within American society, as not only a government entitlement program, but also a market-driven entity embedded within the delivery and consumption of overall healthcare services.[224] As a driver for investment towards quality and efficiency, the Medicare program "should provide

---

[216] Id.

[217] Id. at 3.

[218] Google and Microsoft efforts mentioned *infra* at page 33.

[219] Id.; National legislation includes strict penalties for any breaches in the authorization process.

[220] Id.

[221] Id.

[222] *Speaking for Consumers on Health IT*. Health Affairs: The Policy Journal of the Health Sphere: August 20, 2008; http://healthaffairs.org.blog/2008/08/20/speaking-for-consumers-on -health-it/.

[223] "Information technology in health care." Report to the Congress: New Approaches in Medicare. (June 2004) MedPac, Washington, D.C.: 157-181.

[224] Id.

its beneficiaries with access to appropriate, high quality care while spending the money entrusted to it by the taxpayers as carefully as possible."[225]

Barriers to implementing HIT through the Medicare program, however, include costs and complexities of the actual HIT hardware and software integration.[226] A change in payment structure to reward quality through pay-for-performance (P4P) as opposed to volume through fee-for-service (FFS) can be an initial measure that facilitates the transition to an e-health infrastructure.[227] A patient-centered model of healthcare delivery through a 'medical home' concept could also excel where HIT can enable remote access to healthcare and alleviate the discrepancies that exist between urban and rural healthcare.[228] Standardization of record formats, nomenclature, and communication protocols therefore become a necessity in providing consistency in healthcare, or at least enabling a common system of data entry nationwide.[229]

Currently, Medicare's use of HIT exists primarily in areas of coding for billing and claims purposes.[230] In fact, few healthcare providers have fully adopted HIT, especially where there is a low diffusion of technology and minimal enforcement for HIT use.[231] The delivery of quality healthcare requires providers and patients to integrate complex information from many different sources, and yet, federal leadership has failed to ensure the quality that protects American citizens and the oversight necessary for one of the nation's largest and fastest growing federal budget expenditures. [232] Providers and patients need better tools to complement their capabilities in serving patients, and patients need better access.[233] These stages of development, however, may not be achieved all at once. Consequently, providers who take action to purchase the HIT systems or participate in pilot programs incorporating HIT better position themselves within a competitive market of healthcare. Following necessary innovative steps to accommodate HIT within the vast health infrastructure that already exist takes time. Thus,

---

[225] Miller, Mark E. Report to the Congress: Reforming the Delivery System. (September 2008) MedPac. Washington, D.C.
[226] Id.
[227] Id.
[228] See Id.
[229] Id.
[230] Id.
[231] Id.
[232] See Id. at 158.
[233] Id.

patients may have to wait a little longer to have similar functionality and access to their own detailed medical records, or perhaps to even attain a summary of their records.[234]

As compared to any other industry, the healthcare system uses less IT, the vast extent and complexity of information requiring providers to increase their investments in HIT.[235] This leads to private purchases of HIT in a healthcare market where the directly proportional relationship between purchasing price and increasingly innovative system creates a multitude of comparable differences and variations in IT structure itself.[236] The U.S. Medicare program demonstrates that federally implemented HIT can hold down health costs overall, as well as expenses for the purchase and maintenance of HIT systems.[237] A Medicare P4P demonstration to improve quality has resulted in an extra $16.7 million for ten large group practices nationwide, a 20% savings which provided better, more coordinated care for patients at group practices over the past two years, and delivered $5.8 million to the Medicare Trust Fund.[238] Though this was not initially intended as an HIT study, the demand for HIT support and management of patients' chronic diseases persuaded the medical groups to implement particular HIT systems to report performance.[239] Their use of HIT to monitor and improve quality of healthcare services involved tracking health conditions such as diabetes, heart failure and coronary artery disease.[240] Most of the practices utilized HIT systems that they already had in place prior to the demonstration project began, but enhanced their systems to meet the project's needs; most implementation of which included using EHRs.[241] Costs were reduced by avoiding unnecessary hospitalizations and avoiding unnecessary intensive care services when patients' conditions spiraled out of control.[242] As a result of HIT utilization, the enablement of e-health through HIT implementation was proven to have an advantageous impact on healthcare delivery where HIT systems can be implemented appropriately and effectively.[243]

---

[234] See *National Programme for IT in the NHS, Benefits Statement* 2006-2007*;* http://www.connectingforhealth. nhs.uk/about/benefits/statement0607.pdf? (Accessed December 3, 2008).
[235] Ferris, Nancy. Government Health IT. *Medicare Demo Shows Health IT Can Help Hold Down Health Costs.* http://www.govhealthit.com/online/news/350516-1.html?type=pf (Accessed Nov. 25, 2008).
[236] See Id.
[237] See Id.
[238] Id.
[239] Id.
[240] Id.
[241] Id.
[242] Id.
[243] See Id.; All HIT do not necessarily have to be customarily designed, though standardized frameworks may provide greater consistency across all of healthcare.

As endorsed by the Cleveland Clinic, Google has been developing a consumer health information system.[244] In February 2008, the pilot project began to link health information with Google personal records, the number of personal health records exceeding 100,000 at the Cleveland Clinic.[245] A person can approve the transfer of their health information, medical conditions, allergies, medications and lab results from the clinic's computers to their Google personal health record, within protections of security and privacy.[246] As an exemplary internet-based system, this conversion to an accessible personal record undoubtedly responds to the demands of the consumer.[247] Through advertising an HIT system, like Google personal health records, the consumer demand likely will increase and drive further implementation of HIT systems and e-health overall.[248]

By maintaining electronic records within federally funded entitlement health programs such as Medicare and Medicaid, greater efficiency and quality measures can be attained. For example, dual eligibles[249] may be better tracked through electronic records to eliminate duplicate testing and promote cost-efficiency.[250] Medicare can support HIT investment through federally qualified health centers (FQHCs) as based on an all-inclusive per visit rate that is calculated using FQHCs' reasonable costs.[251] Though the Medicare program's costs are rising, and spending is outpacing growth in revenue, HIT seems sensible to implement cost-efficient measures, at least to the extent of establishing a set of standards.[252]

---

[244] Lohr, Steve. *Google Health Begins Its Preseason at Cleveland Clinic.* The New York Times: Feb. 21, 2008; http://bits.blogs.nytimes.com/2008/02/21/google-health -begins-its-preseason-at-cleveland-clinic.
[245] Id.
[246] Id.
[247] See Id.
[248] See Id.
[249] 'Dual eligibles' refers to the Medicare population (either over age 65 years or permanently disabled) who also qualify for state supplemented Medicaid reimbursements because of their qualified low-income status.
[250] Dutton, M. and Epp, P. *Health IT: Supporting Health-Center IT Investments Through Medicare and Medicaid.* Health Affairs: The Policy Journal of the Health Sphere: December 5, 2007; http://healthaffairs.org.blog/ 2007/12/05/health-it-supporting-health-center-it-investments/.
[251] Id.
[252] See *Medicare Costs Rising*; http://seniorhealth.about.com/library/weekly/aa010301a.htm?p=1.

Innovation Impacting HIT

The 4th Annual World Healthcare Innovation and Technology Congress convened on December 8-10, 2008 in Washington, D.C. to bring together over 400 healthcare executives for discussions on the next generation of innovation and technology.[253] The technology showcases provided solutions for providers to demonstrate their leading-edge technologies, the key speakers including George C. Halvorson, Executive Officer, Kaiser Foundation Health Plan, Inc. and Kaiser Foundation Hospitals; Newt Gingrich, former Speaker, U.S. House of Representatives and Founder, Center for Health Transformation; Peter Neupert, Corporate Vice-President, Health Solutions Group, Microsoft Corporation; among other federal and state government policy representatives within areas of HIT transformation including Lori Evans, Deputy Commissioner, Office of Health Information Technology Transformation, NYS Department of Health; Janet Marchibroda, Chief Executive Officer, eHealth Initiative and Foundation; and Tony Trenkle, Director, Office of e-Health Standards and Services Centers for Medicare and Medicaid Services.[254] A number of participants and high level officers within Health Systems, Government and Policy Centers, Financial and Academic Institutions, and Technology Businesses held a centered interest in the area of HIT.[255] However, their contributions in combination with in-depth investor and executive perspective recognized a wide range of healthcare technology solutions, with current focus on "finding *and* funding the cures of tomorrow."[256]

Recent Intellectual Property Filings for HIT within the USPTO

Within the United States Patent and Trademark Organization (USPTO), recently filed patent applications and issued patents in HIT include an electronic medical record registry system,[257] clinical communication devices and a hospital information system,[258] a user interface systems that integrates e-healthcare information systems,[259] an EMR information management

---

[253] World Healthcare Innovation and Technology Congress (WHIT v. 4.0) (2008); http://www.worldcongress.com/ events/HT08010/; (Accessed September 18, 2008).
[254] Id.
[255] See Id.
[256] See Health Care Innovations 2007; http://healthcare.dowjones.com/. (Accessed September 18, 2008).
[257] U.S. Patent Application No. US 2005/0187794 A1.
[258] U.S. Patent Application No. US 2008/0021738 A1.
[259] U.S. Patent No. US 7,275,220 B2.

systems,[260] a medical advisory system,[261] a rules-based patient care system,[262] and decision support systems that manipulate medical data.[263] Though this may not be an extensive list, the representative filings within the intellectual property area of HIT are leading systems that businesses have begun to recognize as foreseeable in the near future.

By exploring the areas of HIT patenting and application filings, the public and private sectors have a recognized interest in facilitating particular areas of HIT innovation. U.S. leadership promoting public health ensures competitive innovation in the overall healthcare market, driving not only medical technology discoveries, but also HIT systems that interface and integrate with these medical technologies systems.

The World Health Organization Addresses HIT Intellectual Property

In October 2006, China and Marshall Islands conducted trainings on HIT, and the Philippines and Vietnam conducted assessments on the status of emergency management information systems.[264] They sought to improve systems of electronic health (e-health) through electronic records management, electronic classification and coding, improved diagnosis recording and clinical documentation.[265] For most developing countries, health information systems in the private sector inadequately address information management, most efforts of which focus on upgrading information management skills and capacity-building.[266]

In September 2006, a workshop in Manilla regarding Developing Integrated National Health Information Systems reviewed the content and flow of data collected by various technical programs in health ministries to agree on a common platform for the sharing and use of specific information.[267] Six countries set forth key functional areas for data integration in consideration of various funding initiatives such as the Global Fund to Fight AIDS, Tuberculosis and Malaria, the Global Alliance for Vaccines and Immunization, and the Health Metric Network.[268]

---

[260] U.S. Patent Application No. US 2001/0049610 A1.
[261] U.S. Patent Application No. US 2006/0253296 A1.
[262] U.S. Patent No. US 7,315,825 B2.
[263] U.S. Patent No. US 7,213,009 B2.
[264] *Health Information and Evidence for Policy.* The Work of WHO in the Western Pacific Region, 2006-2007: p.54-55.
[265] Id.
[266] Id.
[267] Id.
[268] Id.

As conducted in the Philippines over the past year, an e-health project implemented diagnoses through telephone consultations on radiology with primary health centers.[269] Kelantan State in Malaysia implemented a geographical HIT system for the surveillance of infectious disease in 2006.[270] Through evidence-based medicine and electronically managed HIT systems, these countries have been supporting the use of clinical tools and modeling to improve quality care and cost.[271] The World Health Organization (WHO) plans to continue support in these regions to facilitate HIT research that can improve health policy-making.[272]

While the WHO in combination with the World Intellectual Property Organization (WIPO) has strengthened education and training in the management of HIT, WHO Director-General, Margaret Chan, has stressed the importance of negotiations where the existing intellectual property (IP) system lacks economic incentives for the private sector to invest in research and development for diseases primarily affecting those who cannot afford to pay the higher prices.[273] Effectually, this pertains to the U.S. healthcare system as well.[274] The incentives for the private sector to significantly invest and market to healthcare delivery systems has limitations where those who might reap the greatest benefits are those who cannot afford to pay the steep prices for HIT research, development, and implementation.[275]

The International Chamber of Commerce (ICC) believes that maintaining IP protection for innovation contributes to improving overall public health.[276] Published patents and patent applications provide a rich source of technical and scientific information to enable researchers globally to develop their inventions.[277] The ICC suggests that the WHO take an evidence-based approach to propose solutions for public health that are generally accepted in scientific and economic methods.[278] Similarly, U.S. healthcare can also be enhanced through the integration of generally accepted scientific and economic methods that employ HIT systems.[279]

---

[269] Id.

[270] Id.

[271] Id.

[272] Id.

[273] Mara, Kaitlin and New, William. *IPW: WHO Members Inch Towards Consensus on IP, Innovation, and Public Health*. Campaign for Access to Essential Medicines (May 2, 2008).

[274] See Id.

[275] See Id.

[276] International Chamber of Commerce. *Intellectual Property and Medical Innovation.* Paris, France (September 28, 2007); www.iccwbo.org.

[277] Id.

[278] Id.

[279] Id.

Promoting e-Health through HIT Integration into Existing Infrastructure

From the evidence of literature on HIT, the possibility of savings appears to depend on their source and whether that source is in a hospital setting or in a clinic or physician's office.[280] Savings are difficult to assess because of modification of a physician's practice, for example, in the offset of overall increased costs or reduced efficiency in another area.[281] Therefore, estimating the potential sources of savings is difficult given the greater exchange of information among providers, insurers, and patients, as well as the early stage of HIT development.[282]

While trying to promote e-healthcare through the integration of HIT into existing health infrastructure, physicians and health provider networks need to become familiar with the technology, processes, and implementation. Transitioning into any e-system requires general awareness and education to effectively utilize and maximize IT performance. In addition, incentives and risks must be balanced to accommodate perceived needs. In doing so, current legislation may provide direction in providing and understanding new information exchange.

Making the Transition

In trying to design a system to beneficially impact American society and the delivery of healthcare in the United States, the impact of education facilitates discussions and drives reform.[283] Figure 5 illustrates the hierarchy of absorption, adaptation and adoption of market-based technology.[284]

To better understand how HIT interplays within the U.S. and global healthcare market, education in collaboration with economic analyses and public-private partnerships will impact the evaluation.[285] Considering cost and complexity of HIT, and even affordability, will consequentially lead to finding the 'right system.'[286]

---

[280] Congress of the United States Congressional Budget Office. *Key Issues in Analyzing Major Health Insurance Proposals.* December 2008: 150.
[281] Id.
[282] Id.
[283] See The World Bank. *Economics of Education;* http://go.worldbank.org/78EK1G87MO. (Accessed September 18, 2008.)
[284] Watkins, Alfred and Ehst, Michael. Eds. *Science, Technology, and Innovation: Capacity Building for Sustainable Growth and Poverty Reduction.* The World Bank: Washington, D.C. (2008).
[285] See Id. at 31.
[286] Firshein, J. and Broder, C. *Physician Adoption of Electronic Health Records Still Extremely Low, but Medicine May Be AT a Tipping Point.* The Health Information Technology Adoption Initiative. Jun 18, 2008; http://hitadoption.org/index.php?module=New&id=cntnt01&cntnt01action=detail&cntnt.

Figure 5: The Hierarchy of Adopting HIT into an Innovative Market Economy.[287]
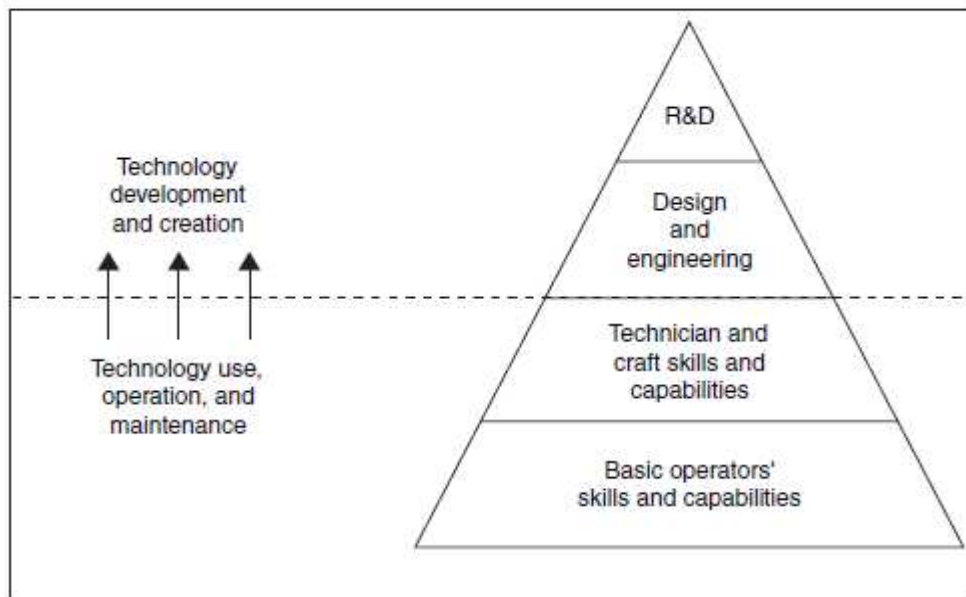
Source: Arnold, Bell, Bessant, and Brimble 2000.
Note: R&D = research and development.

Several factors play into transitioning from the current U.S. health infrastructure (as substantially paper-based, or based on electronic coding) to an e-health system with innovative HIT. Making the transition to digital records probably will cost about $60,000 for individual doctors or small practices.[288] The size and setting of the healthcare facility continue to influence EHR incorporation.[289] While physicians may be slow to adopt the technology, the Department of HHS Secretary, Michael O. Leavitt, announced that Medicare would provide $150 million to 12 cities and states to help physician adopt EHRs.[290] The five-year effort will help 1200 small practices nationwide switch from paper to digital recordkeeping.[291]

A survey demonstrated that 16% of physicians in their practice had purchased HIT; 26% of physicians had plans to purchase digital recordkeeping in the next two years.[292] The increased

---

[287] See Id.
[288] Id.
[289] Firshein, J. and Broder, C. *Physician Adoption of Electronic Health Records Still Extremely Low, but Medicine May Be AT a Tipping Point*. The Health Information Technology Adoption Initiative. Jun 18, 2008; http://hitadoption.org/index.php?module=New&id=cntnt01&cntnt01action=detail&cntnt.
[290] Id.
[291] Id.
[292] Id.

use of HIT, however, was more prevalent among younger physicians, primary care settings, larger practices, hospitals and medical centers, and Western United States.[293] As estimated by Massachusetts General Hospital (MGH) and George Washington University (GWU), about 25% of their physicians currently use EHRs to improve care for patients.[294] About 5% of America's 6000 hospitals have adopted computerized physician order entry (CPOE) systems, a component of EHRs to help reduce medical errors and ease care delivery.[295]

Since no standard definition of EHR has been accepted, nor any definition of what 'adoption' of EHR means, a better definition of EHRs is essential in moving forward to promote nationwide systemic reform.[296] Consistency in terminology will be required and adoption will demand financial incentives to overcome cost barriers, with laws and regulations to enforce HIT adoption and implementation.[297] The state of technology and organizational influences (such as the size of practice or hospital or payer mix), along with measures to determine the level of integration within a particular healthcare system, will also be influential in the adoption of HIT.[298]

Physicians with e-records state that a difference exists for their patients.[299] Studies have indicated that fully operational EHRs have produced satisfactory outcomes for large majorities who have supported HIT use in its ability to help improve clinical decisions, provide more effective communications with other providers, and facilitate prescription refills and avoidance of medical errors.[300] HIT has positively influenced the effective delivery of chronic and preventative care.[301] Physicians have also been more capable of avoiding problematic medication interactions.[302] Thus, HIT for these physicians has promoted more efficient ordering of laboratory tests.[303]

---

[293] Id.

[294] *Multiple Barriers Keeping Adoption Rates Very Low.* The Health Information Technology

[295] Id.

[296] Id.

[297] Id.

[298] Id.

[299] Id.

[300] Firshein, J. and Broder, C. *Physician Adoption of Electronic Health Records Still Extremely Low, but Medicine May Be AT a Tipping Point*. The Health Information Technology Adoption Initiative. Jun 18, 2008; http://hitadoption.org/index.php?module=New&id=cntnt01&cntnt01action=detail&cntnt.

[301] Id.

[302] Id

[303] Id.

Consequently, these studies have politically been endorsed by presidential elect, Barack Obama.[304] Through proven quality, and as demonstrated globally, HIT systems will have the support of President Obama. Implementation of the HIT system therefore has the opportunity to be incentivized through physician loans and incentive programs for the direct purchase of HIT (with protection from liability for external tampering).[305]

Technology alone, however is not the solution.[306] Technology and policy must evolve "hand in hand."[307] As suggested by Mark Leavitt (HHS Secretary) and the Certification Commission for Healthcare Information Technology (CCHIT), HIT and healthcare transformation provide practical tools and leverage to accomplish a unified strategy for quality and cost-efficient healthcare.[308] Moving forward therefore requires that the entire health sector to first have an awareness of the technology prior to seeing its potential for benefits.[309]   Figure 6 depicts the dimensions of technological capacity that are required for countries, including the United States, to build upon existing research and development efforts, or even implement changes to an existing system such as healthcare.[310] Figure 7 represents firms or organizations according to technological capacity, whereby creating an awareness of the need to change and an awareness of what and how to change allows organizations to address their HIT capacity concerns.[311]

---

[304] Id.

[305] Id.

[306] Leavitt, M. *Health IT Initiatives: Not Magical, Just Practical.* Health Affairs: The Policy Journal of the Health Sphere: August 19, 2008; http://healthaffairs.org.blog/2008/08/19/health-it-initiatives-not-magical-just-practical/.
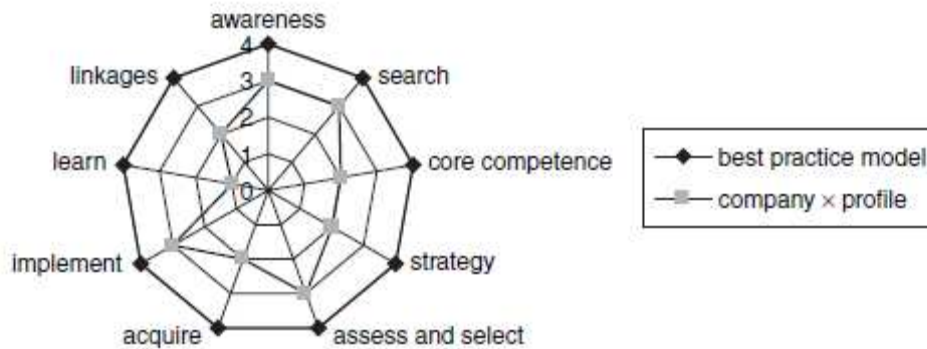
[307] Id.

[308] Id.

[309] Id.

[310] See Watkins, Alfred and Ehst, Michael. Eds. *Science, Technology, and Innovation: Capacity Building for Sustainable Growth and Poverty Reduction*. The World Bank: Washington, D.C. (2008), p.33.
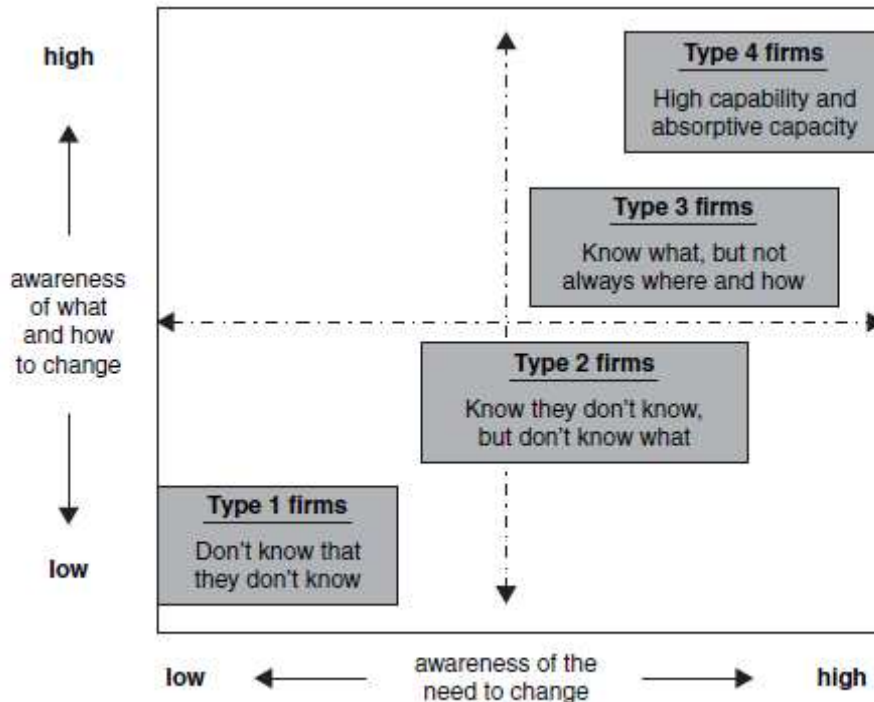
[311] See Id. at 34.

Figure 6: Dimensions of Technological Capacity as Applicable to HIT.[312]

Source: Arnold, Bell, Bessant, and Brimble 2000.

Figure 7: Firms/Organizations Arranged According to Technological Capacity and Levels of Awareness in Recognizing the Need for Change.[313]

Source: Arnold, Bell, Bessant, and Brimble 2000.

---

[312] See Id. at 33.
[313] Id. at 34.

Correspondingly, HIT has been included in legislative bills, such as in the Medicare Improvement for Patients and Providers Act, MIPPA.[314] A range of dialog has been increasing to the extent of determining well-known financial costs.[315] CCHIT has also been researching HIT incentive programs, with highlighted programs including:

> ➤ The Centers for Medicare and Medicaid Services (CMS) EHR demonstration project which provides incentives for EHR adoption, in combination with quality improvement, amounts to $150 million: 1200 practices can receive up to $58,000 per physician or $290,000 per practice;[316]

> ➤ Medicare Improvements for Patients and Providers Act (MIPPA) of July 2008 include incentive payments for physicians who use e-prescribing technology (providing a 2% differential);[317]

> ➤ State, regional and local governmental programs in California, Colorado, Massachusetts, Michigan, Minnesota, New York, Vermont, and other regions offer grants, loans, and such mechanisms of financial support for adoption of certified EHRs;[318] and

> ➤ Emerging HIT for Children in Medicaid and SCHIP Programs, which covers the nation's low-income children, provides access to healthcare and services that have evolved to reflect changing trends in health coverage and delivery, incl advances in health IT (States have acted as innovators in utilizing HIT in Medicaid and SCHIP programs.[319]).[320]

The roadmap for moving ahead with HIT tools involves coordinating and leveraging resources from the private sector in combination with implementation and enforcement through federal leadership.[321] As an established entitlement program within the federal system, and funded through the federal budget, Medicare has the leadership advantage in promoting

---

[314] Id.
[315] Id.
[316] Id.
[317] Id.
[318] Id.
[319] Morrow, Beth. Emerging Health Information Technology for Children in Medicaid and SCHIP Programs: e-health snapshot. The Kaiser Commission on Medicaid and the Uninsured and The Children's Partnership: November 2008, p.11.
[320] Id.
[321] Id.

necessary funding of HIT and encouraging adoption of a standardized HIT system throughout the U.S. healthcare system.[322] Additional federal support for a standardized HIT system would advance state Medicaid and SCHIP HIT efforts as well.[323]

Incentives and Risks

Educating consumers in both public and private sectors includes offering incentives to promote the establishment of HIT. Private sector plans, including the Hawaii Medical Service Association, Highmark in Pennsylvania, and CareFirst in the Maryland, D.C., Deleware, Virginia area, have begun offering health IT financial incentives.[324] Also, a safe-harbor exemption from Stark/Antikickback laws established in 2006 permits donation of certified EHRs to physicians by hospitals offering this option to their affiliated physicians.[325] EHRs have therefore been made available to hundreds of physicians at reduced prices, with potential cost savings of over a million dollars.[326]

Understanding the perceived risks of HIT allows the user to better implement and address HIT functioning, compatibility, interoperability with other systems, and privacy concerns.[327] Certification of HIT systems can ensure credibility.[328] The goal then would be to broaden participation in utilizing HIT systems in an open, transparent process.[329]

Again, government leadership is necessary where the people need to be assured of the government's long-term commitment to HIT leadership.[330] By strengthening cohesive and collaborative efforts to accelerate the use of HIT, efficient healthcare can be accessible for all.[331] Not all may agree[332] that the incentives offered are equally distributed or even open for distribution, but the absence of standards regarding contractual obligations, reasonable charges, disputes, and liability perpetuates the current lack of interest among parties for collaboration with

---

[322] Id.
[323] Id.
[324] Leavitt, M. *Health IT Initiatives: Not Magical, Just Practical.* Health Affairs: The Policy Journal of the Health Sphere, 4: August 19, 2008; http://healthaffairs.org.blog/2008/08/19/health-it-initiatives-not-magical-just-practical/.
[325] Id.
[326] Id.
[327] Id.
[328] Id.
[329] Id. at 5.
[330] Id.
[331] Id.
[332] Some physicians view CMS bonus payments of 1-2% as an insult. *Id.*

national labs, local hospitals, and other healthcare provider facilities.[333] The federal government can drive this collaboration.[334]

The Stark HIT Bill, under Rep. Pete Stark (D-Calif.), chairman of the House Ways and Means Committee, introduced the Health e-Information Technology Act of 2008 on Sept. 15th to increase incentives for using HIT and disincentives for failing to do so.[335] The Bill also increases privacy protection for health information and requires HHS to make low-cost, open-source standards-compliant HIT available to healthcare providers no later than mid-2012.[336] Though pending in the House and the Senate, the Bill promotes the need for government to impose order in the fragmented American HIT environment.[337] Private systems have failed because aggregate data cannot be compiled, and thus cannot be analyzed to improve care.[338]

The Bill provides that providers be eligible for incentive payments in the form of Medicare bonus fees up to $40,000 over five years for doctors, and up to several millions for hospitals to encourage use of e-medical records systems.[339] By 2016, those without systems would be penalized by reduction in Medicare payments.[340] Enforcement of privacy, and increased penalties for privacy breaches, under the Health Insurance Portability and Accountabilty Act of 1996 (HIPAA) extend these provisions to new health information organizations (e.g. e-prescribing networks and regional health information exchanges).[341]

However, as stated previously, Medicare can support HIT investment through federally qualified health centers (FQHCs) as based on all-inclusive per visit rates that are calculated using FQHC's reasonable costs.[342] Federal regulations further mandate that "[a]ll necessary and proper expenses…[be] recognized."[343] Necessary and proper costs are defined as "costs that are appropriate and helpful in developing and maintaining the operation of patient care facilities and

---

[333] Id.

[334] Id. at 9

[335] Ferris, N. Government Health IT: *Stark Health IT Bill Calls for Medicare Incentives for Doctors and Hospitals*; http://www.govhealthit.com/online/news/35056healthaffairs.org.blog/2007/12/05/health-it-supporting-health3-1.html?type=pf (Accessed Nov. 25, 2008).

[336] Id.

[337] Id.

[338] Id.

[339] Id.

[340] Id.

[341] Id.

[342] Dutton, M. and Epp, P. *Health IT: Supporting Health-Center IT Investments Through Medicare and Medicaid.* Health Affairs: The Policy Journal of the Health Sphere: December 5, 2007; http://healthaffairs.org.blog/2007/12/05/health-it-supporting-health-center-it-investments/.

[343] Id.

activities."[344] Health IT costs fall within the scope of these rules.[345] Because FQHC's Medicare payments are subject to a reimbursement rate cap impacting 75% of FQHCs nationally, rules have current limited application in supporting HIT in FQHCs.[346,347]

Thus, the merits of the existing cap on Medicare reimbursement for FQHCs are the subject of considerable debate, such that the application of a cap[348] in the context of HIT is inconsistent with federal goals related to HIT adoption.[349] Instead, the movement is toward value-based purchasing and interoperability through the creation of a nationwide health information network.[350] [351] Consequently, federal officials should issue guidance to create an exemption to the Medicare cap for FQHCs HIT investments (e.g. where interoperable EHRs and costs related to participation in health information exchanges support the federal agenda for HIT).[352] FQHCs can also work with state officials to promote the reimbursement for HIT investments that improve patient care, and eventually provide for quality-based reimbursement.[353] Accordingly, FQHCs can align their HIT strategies s with public policy and the health market in regards to healthcare services, delivery, clinical values, and quality-based reimbursements.[354]

---

[344] Id.
[345] Id. at 3.
[346] Id.
[347] The Medicare cap for 2007 was $115.33 for urban FQHCs and $99.17 for rural FQHCs.
[348] When the existing cap was established in 1992, EHRs were not in operation and therefore not a cost considered in the development of the cap.
[349] Dutton, M. and Epp, P. *Health IT: Supporting Health-Center IT Investments Through Medicare and Medicaid.* Health Affairs: The Policy Journal of the Health Sphere: December 5, 2007; http://healthaffairs.org.blog/2007/12/05/health-it-supporting-health-center-it-investments/.
[350] Id.
[351] Id.
[352] Id.
[353] Id.
[354] Id. at 4.

Concluding Remarks

Health IT is key to a broader outcome encompassing quality and efficiency measures.[355] Peoples' demand for new incentive programs may force the government to respond accordingly, or possibly encourage insurance companies to begin rewarding providers.[356] Users with initiatives to generate and manage their own medical information are comparable to vendors who respond in an entrepreneurial, consumer-driven market.[357] Organizations that can handle users' medical information further encourages companies to provide interfaces to the HIT systems of market-leading networks among healthcare and insurance providers.[358]

As mentioned previously, Microsoft and Google are joining in.[359] Where consumers' interests have attention focused on current medical bills or particular health conditions, HIT businesses have their focus on consumer demand.[360] HIT systems that allow easy access from anywhere, particularly having internet access and a graphical user interface, have potential sustainability.[361] Data aggregation and data mining of these HIT systems also have potential to integrate into other areas of innovative e-health - from diets to behavior, genomes, medical records, and pharmaceutical purchases.[362]

Providing quality outcomes therefore relies on collecting data, aggregating data to assess different approaches to prevention and care and improving health outcomes and overall healthcare quality and efficiency. Similarly, the need for establishing a system of standards significantly affects future aggregation and integration of medical data. Therefore, mechanisms and strategies for continued research and development require some utilization of standards for connecting quality care measures and cost-efficiency.

---

[355] Dyson, E. *Health IT: Intelligent Evolution.* The Policy Journal of the Health Sphere: December 5, 2007; http://healthaffairs.org.blog/2008/08/21/health-it-intelligent-evolution/.
[356] Id.
[357] Id.
[358] Id.
[359] Id.
[360] Id.
[361] Id.
[362] Id. at 3.

REFERENCES

AHRQ Launches Quality Measure Database for Health Professionals. HealthBeat;
http://www.ihealthbeat.org/Articles/2008/11/14/AHRQ-Launches-Quality-Measure-Data
(Accessed Nov., 17, 2008).

Berenson, R. A. and Horvath, J. 2003 *Confronting the Barriers to Chronic Care Management in Medicare.* Health Affairs, 22: w37-w53.

Brailer, D. J. *Your Medical History, To Go.* The New York Times. September 19, 2006.

Broder, C. Health information exchange projects underscore challenges, successes. iHealthBeat.
January 6, 2004; http://www.ihealthbeat.org.

Catlin, Aaron et al. (2008) "National Health Spending in 2006: A Year of Change for Prescription Drugs." Health Affairs, January/February 2008, p. 14;
www.healthaffairs.org.

Center for Disease Control (CDC 2008); www.cdc.gov/.

Congress of the United States Congressional Budget Office, *Monthly Budget Review*, Nov. 6, 2007.

Congress of the United States Congressional Budget Office. *Key Issues in Analyzing Major Health Insurance Proposals.* December 2008.

Davis, K. and Cooper, B. S. of the Commonwealth Fund. "American Healthcare: Why So Costly?" Testimony before the Senate Appropriations Subcommittee, June 11, 2003.

Dutton, M. and Epp, P. *Health IT: Supporting Health-Center IT Investments Through Medicare and Medicaid.* Health Affairs: The Policy Journal of the Health Sphere: December 5, 2007; http://healthaffairs.org.blog/2007/12/05/health-it-supporting-health-center-it-investments/.

Dyson, E. *Health IT: Intelligent Evolution.* The Policy Journal of the Health Sphere: December 5, 2007; http://healthaffairs.org.blog/2008/08/21/health-it-intelligent-evolution/.

Eysenbach, G. *What is E-Health?* Journal of Medical Internet Research: v.3(2), Apr-Jun 2001;
http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1761894.

Ferris, Nancy. Government Health IT. *Medicare Demo Shows Health IT Can Help Hold Down Health Costs.* http://www.govhealthit.com/online/news/350516-1.html?type=pf
(Accessed Nov. 25, 2008).

50

Ferris, N. Government Health IT: *Stark Health IT Bill Calls for Medicare Incentives for Doctors and Hospitals*; http://www.govhealthit.com/online/news/35056healthaffairs.org. blog/2007/12/05/health-it-supporting-health3-1.html?type=pf (Accessed Nov. 25, 2008).

Firshein, J. and Broder, C. *Physician Adoption of Electronic Health Records Still Extremely Low, but Medicine May Be AT a Tipping Point*. The Health Information Technology Adoption Initiative. Jun 18, 2008; http://hitadoption.org/index.php?module=New&id= cntnt01&cntnt01action=detail&cntnt.

Gamble, V.N., Stone, D., Ladenheim, K, Gibbs, B.K., et al. *Comparative Perspectives on Health Disparities*. Health Policy, Health Reform, and Performance Improvement. The Commonwealth Fund: v.39, April 26, 2006.

Goetz, T. *Physician, Upgrade Thyself.* The New York Times. May 30, 2007

Grasmick, Mary Kay. Wisconsin Hospitals Invest in Health Information Technology. Wisconsin Hospital Association: Madison, WI. August 20, 2008.

Hamilton, David P. *Incentives at Work: e-Prescriptions on the Rise.* BNET Healthcare. December 16, 2008; http://industry.bnet.com/healthcare/1000269/incentives-at-work-e-prescriptions-on-the-rise/ (Accessed 12/18/2008).

"Healthcare Costs: A Primer" Kaiser Family Foundation, August, 2007; http://www.kff.org. insurance/upload/7670.pdf (Accessed September 18, 2008).

Healthcare Innovations 2007; http://healthcare.dowjones.com/. (Accessed September 18, 2008).

Health Quality & Health Information Technology. National Governors Association; http://www.nga.org/portal/site/nga/menuitem.f5167288cdbd56cfcdcbeeb501010a0/?vgn.

"Information technology in healthcare." Report to the Congress: New Approaches in Medicare. (June 2004) MedPac; http://www.medpac.gov/documents/June04_Entire_Report.pdf.

International Chamber of Commerce. *Intellectual Property and Medical Innovation.* Paris, France (September 28, 2007); www.iccwbo.org.

Jones, J.F. and Whitley, A.H. *CIT Strategic Plan 2007:* National Institutes of Health, Center for Information Technology, June 29, 2007; http://cit.nih.gov/NR/rdonlyres/9EBE6822-B585-4012-84E3-5F360C4C0EAC/0/CITStrategicPlan2007intranet.doc.

Kaiser Family Foundation. *Medicare at a Glance.* February 2007.

Kaiser Family Foundation. *Medicare at a Glance.* November 2008.

Keehan, Sean, et al. (2008). "Health Spending Projections Through 2017: The Baby-Boom Generation is Coming to Medicare." Feb. 26, w145 (www.healthaffairs.org).

51

Leavitt, M. *Health IT Initiatives: Not Magical, Just Practical.* Health Affairs: The Policy Journal of the Health Sphere: August 19, 2008; http://healthaffairs.org.blog/ 2008/08/19/health-it-initiatives-not-magical-just-practical/.

Lohr, Steve. *Google and Microsoft Look to Change Healthcare.* Aug. 14, 2007.

Lohr, Steve. *Google Health Begins Its Preseason at Cleveland Clinic.* The New York Times: Feb. 21, 2008; http://bits.blogs.nytimes.com/2008/02/21/google-health -begins-its-preseason-at-cleveland-clinic.

Lohr, Steve. *Government Wants to Bring Health Records Into Computer Age.* The New York Times. July 21, 2004.

Lohr, Steve. *Microsoft Rolls Out Personal Health Records.* The New York Times. October 4, 2007.

Mahar, Maggie. *The State of the Nation's Health.* Dartmouth Medicine (Spring 2007), p.30; http://dartmed.dartmouth.edu/spring07/pdf/atlas.pdf.

Mara, Kaitlin and New, William. *IPW: WHO Members Inch Towards Consenses on IP, Innovation, and Public Health.* Campaign for Access to Essential Medicines (May 2, 2008).

Marshfield Clinic Health News: Electronic Medical Record Improves Healthcare; http://www.marshfieldclinic.org/patients/?page=cattails_2005_sepoct_paperless (Accessed Nov. 17, 2008).

Medicare: A Primer. March 2007. Kaiser Family Foundation.

Medicare Costs Rising; http://seniorhealth.about.com/library/weekly/aa010301a.htm?p=1.

Miller, Mark E. Report to the Congress: Reforming the Delivery System. (September 2008) MedPac. Washington, D.C.

Morrow, Beth. Emerging Health Information Technology for Children in Medicaid and SCHIP Programs: e-health snapshot. The Kaiser Commission on Medicaid and the Uninsured and The Children's Partnership: November 2008.

Multiple Barriers Keeping Adoption Rates Very Low. The Health Information Technology.

National Programme for IT in the NHS, Benefits Statement 2006-2007*;* http://www.connectingforhealth.nhs.uk/about/benefits/statement0607.pdf? (Accessed December 3, 2008).

Nichloson, Lorraine. Electronic Health Records in the United Kingdom of Great Britain & Northern Ireland. Electronic Health Records (EHR) Conference, Amsterdam: June 12, 2008; http://www.ifhro.org/docs/EHRintheUnitedKingdomofGreatBritain&Northern Ireland/.

Office of Management and Budget, *Budget of the United States Government: Fiscal Year 2006* (Government Printing Office, 2006), Historical Tables.

Our Pen-and-Paper Doctors. The New York Times. June 24, 2008; http://www.nytimes.com/ 2008/06/24/opinion/24tue2.html?sq=Health Information technology.

Parliamentary Office of Science and Technology 2004, NHS 2004, Naik 2003, Dodge 2004.

Reid, T.R. *Sick Around the World.* PBS: Frontline. April 15, 2008; http://www.pbs.org/wgbh/ pages/frontline/sickaroundtheworld/.

Reid, T.R. *Taiwan Takes Fast Track to Universal Healthcare.* NPR. April 15, 2008; http://www.npr.org/templates/story/story.php?storyId=89651916 (Accessed December 6, 2008).

Rivlin, A. and Antos, J. Eds. Restoring Fiscal Sanity 2007: The Health Spending Challenge. Brookings Institute Press: Washington D. C. 2007.

Shimada, Haruo and Kondo, James. *Japan HIT Case Study.* The National Bureau for Asian Research (NBR) Center for Health and Aging: Health Information Technology and Policy Lab (2007); http://pacifichealthsummit.org/downloads/HITCaseStudies/Economy/ JapanHIT.pdf (Accessed Dec. 6, 2008).

Speaking for Consumers on Health IT. Health Affairs: The Policy Journal of the Health Sphere: August 20, 2008; http://healthaffairs.org.blog/2008/08/20/speaking-for-consumers-on - health-it/.

U.S. Patent No. US 7,315,825 B2.

U.S. Patent No. US 7,275,220 B2.

U.S. Patent No. US 7,213,009 B2.

U.S. Patent Application No. US 2001/0049610 A1.

U.S. Patent Application No. US 2005/0187794 A1.

U.S. Patent Application No. US 2006/0253296 A1.

U.S. Patent Application No. US 2008/0021738 A1.

Ward, Getahn. *Hospitals Take It Slow with Electronic Recordkeeping.* The Tennessean.
    (October 29, 2008); http://www.tennessean.com/apps/pbcs.dll/article?AID=/
    20081029/COLUMNIST0304.

Watkins, Alfred and Ehst, Michael. Eds. *Science, Technology, and Innovation: Capacity
    Building for Sustainable Growth and Poverty Reduction.* The World Bank: Washington,
    D.C. (2008).

Wennberg, J.E., Fisher, E.S., Goodman, D.C., Skinner, J.S. The Dartmouth Atlas of Healthcare
    2008. The Dartmouth Institute for Health Policy and Clinical Practice: Lebanon, New
    Hampshire (2008); http://www.dartmouthatlas.org/atlases/2008_Chronic_Care_Atlas.pdf.

The World Bank. *Economics of Education;* http://go.worldbank.org/78EK1G87MO. (Accessed
    September 18, 2008.)

World Healthcare Innovation and Technology Congress (WHIT v. 4.0) (2008);
    http://www.worldcongress.com/events/HT08010/; (Accessed September 18, 2008).

Other sources:

http://hitadoption.org/index.php?module=News&id=cntnt01&cntnt01actions=print&cntnt.

http://www.connectingforhealth.nhs.uk/ (Accessed December 3, 2008).