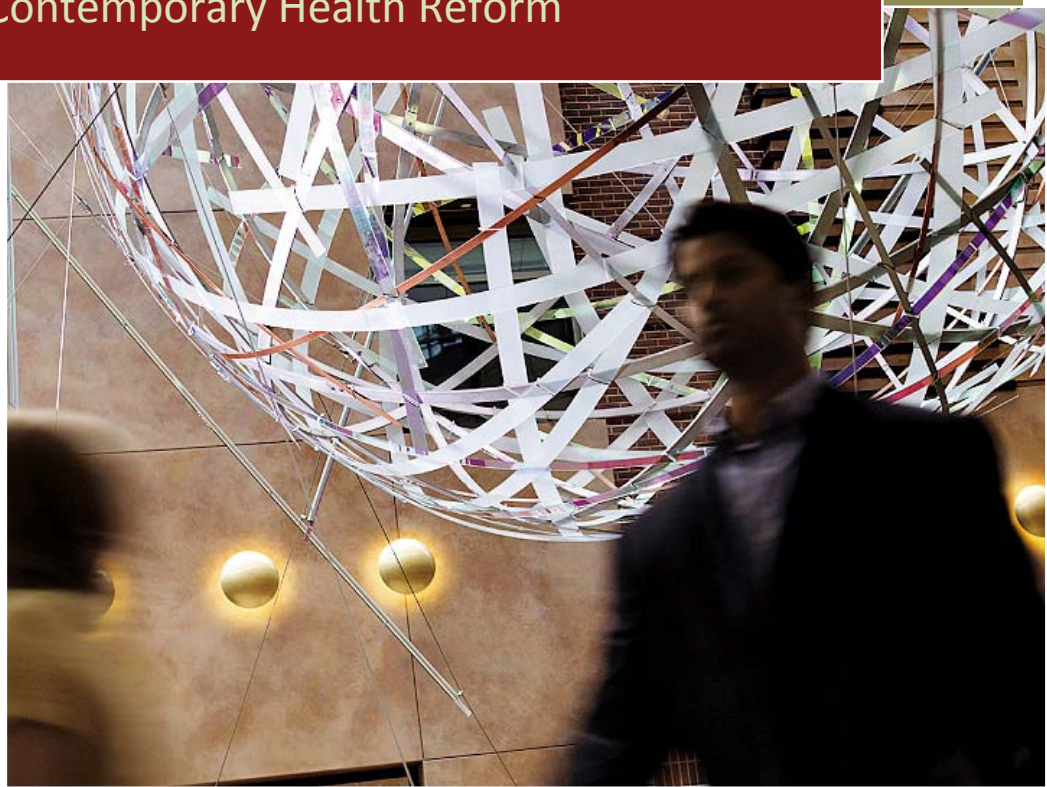


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HIT: Conditions for the Positive Impact of  
Health IT on Contemporary Health Reform



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## **Abstract**

*Congress recently enacted the American Reinvestment and Recovery Act of 2009, which among other things, stipulates adoption of health information technology to meaningful use no later than 2016. Most analysts agree that there are significant benefits associated with the implementation of HIT, but it is possible that congress has moved too quickly in designing a timeline for implementation because it seems clear that certain conditions must be met for HIT to be a game-changing means to an end of health reform. This paper will discuss the potential benefits of HIT and the environment necessary for those benefits to be reached to full potential. It will also touch lightly on policy recommendations to mitigate the inherent risks of HIT implementation.*

An unprecedented economic crisis that has reached into the financial sector has severely hampered healthcare providers' access to capital, effectively halting new building projects, facility upgrades, and new equipment purchasing. Hospitals and other providers are forced to find profitability growth in other parts of the business such as greater efficiencies and lower costs, which can be facilitated by information technology. However, the economic crisis has left many health organizations with no choice but to decrease IT spending. According to a March survey conducted by PricewaterhouseCoopers, 82% of hospitals surveyed reduced their IT budgets by an average of 10% with 10% reducing budgets more than 30% (Wicklund, 2009). Half of the CIOs surveyed said that federal funding is crucial to the implementation of electronic health records (EHRs). The stakes were raised with the passing of the American Recovery and Reinvestment Act of 2009 (ARRA), which among other things, stipulated a healthcare industry transition to EHRs operating within an interoperable IT system(s) to be implemented with "meaningful use" between 2011 and 2016. Most analysts believe that, in fact, there are great efficiencies and monetary savings to be gained by implementing an appropriate health information technology (HIT) system, but there is no denying that the cost to both the American government and to participating healthcare providers is substantial. Articles and think-tank studies that discuss the costs and potential benefits of a nationwide HIT system are abundant. This paper will build upon preceding articles to discuss the main items that must fall into place for the potential benefits of HIT to be realized. Specifically, I will delve into the key assumptions that "must be true," in some form, to justify the intense capital investment that accompanies HIT by realizing the benefits that can promote healthcare reform.

Almost all personal health information (PHI) in today's healthcare environment is generated by and resides with the health provider with little interoperability. A patient's primary care physician may write a prescription for the patient, but if he or she sees another physician for some reason, the new physician will generally not know about that prescription unless the patient thinks to tell the doctor (Hillestad, et al, 2008). Numerous data systems among providers and payers have created an extremely fragmented system that requires consolidation at some level. Attempts to share provider-held data do, in fact, occur through regional health information organizations (RHIOs). However, adoption remains relatively bleak and reliability of the statistical matching system is questionable at best (Hillestad, et al, 2008). Recent studies suggest that fewer than 20% of American doctors' offices offer EHRs (HIT or Miss, 2009) and those that do, operate on a variety of systems from a variety of HIT vendors. In fact, a recent study financed by the federal government and the Robert Wood Foundation that measured the adoption of digital patient records suggested only 9% of the nation's hospitals currently have [EHRs] (Lohr, 2009). Despite the fact that adoption of HIT systems has been strong of late, it seems that complete and meaningful use of HIT available to all Americans was as far away four months ago as it was two decades ago.

### **American Recovery and Reinvestment Act of 2009 (ARRA)**

Congress enacted the American Reinvestment and Recovery Act of 2009, which was signed into law by President Barack Obama in February. Among the many components related to the healthcare industry it stipulated "the development of a nationwide health information technology (HIT) infrastructure that allows for the electronic use and exchange of information"

(111<sup>th</sup> Congress, 2009) among providers (hospitals and physician groups), payers, and patients.

This \$19 billion program promotes the adoption and use of HIT with particular emphasis on electronic medical records (EMRs). It is important to note, however, the actual cost of the program is, in fact, greater than the \$19 billion figure that includes an expected \$12 billion of savings. Some estimate costs as high as \$50 billion, but all remain mere estimates in the short-term time horizon (Troy, 2009). The act also mandates 11 sub requirements – that HIT:

1. ensures that each patient's health information is secure and protected, in accordance with applicable law;
2. improves healthcare quality, reduces medical errors, reduces health disparities, and advances the delivery of patient-centered medical care;
3. reduces healthcare costs resulting from inefficiency, medical errors, inappropriate care, duplicative care, and incomplete information;
4. provides appropriate information to help guide medical decisions at the time and place of care;
5. ensures the inclusion of meaningful public input in such development of such infrastructure;
6. improves the coordination of care and information among hospitals, laboratories, physician offices, and other entities through an effective infrastructure for the secure and authorized exchange of healthcare information;
7. improves public health activities and facilitates the early identification and rapid response to public health threats and emergencies, including bioterrorism events and infectious disease outbreaks;

8. facilitates health and clinical research and healthcare quality;
9. promotes early detection, prevention, and management of chronic diseases;
10. promotes a more effective marketplace, greater competition, greater systems analysis, increased consumer choice, and improved outcomes in healthcare services; and
11. improves efforts to reduce health disparities.

Private practice physicians, under this HIT plan, are eligible for payments over five years of \$44,000 to \$65,000 for showing meaningful use of HIT, such as through the reporting of quality measures. This is consistent with the estimates of some that costs to providers of purchasing, installing, and implementing an EHR system in a medical office are about \$40,000 per physician (Blumenthal, 2009). However, in a recent study PricewaterhouseCoopers Health Research Institute suggested that the incentive does not cover the costs of implementation. It estimated that an “average three-physician practice must invest between \$173,000 and \$296,000 over two years” (Wicklund, 2009). Rather, Wicklund suggested, the long-term potential for lost revenue for failure to adopt can act as a motivator. Physicians, if they fail to adopt HIT before 2016, will suffer penalties in the form of decreased Medicare and Medicaid reimbursements.

Hospitals will also be eligible for additional payments from Medicare and Medicaid of at least \$2 million, and as high as \$11 million (depending on size of the institution) if they adopt Hit before fiscal 2013. Hospitals, too, will suffer the penalties in the form of decreased Medicare and Medicaid payments from failure to adopt by fiscal 2016.

It seems clear in both the design of the bill and the tone of the administration that the adoption of HIT is meant to serve as a means to an end “of improving the quality of healthcare, the

health of populations, and the efficiency of healthcare systems” (Blumenthal, 2009). Therefore, it is also important on the front-end to consider the definition of successful implementation and adoption. Congress, it seems, defines success as the improvement of such metrics relating to both quality of care and efficiency of healthcare systems, which seemingly, can only be realized with nationwide adoption and meaningful use in direct relation to the evolving challenges in the US healthcare system.

### **The HIT Value Proposition**

Contemporary health reform in the United States is primarily concerned with three central issues: increasing the quality and safety of care, decreasing the cost of care, and improving the access of care to reach *all* Americans. HIT, as mentioned previously and defined in ARRA, is not meant to serve as an end in itself, but rather a cog in the larger system of healthcare reform acting as a means to an end of achieving the three central goals set forth. It is important, then, for the conversation, to understand how HIT furthers the cause of healthcare reform in achieving those goals. Analysts across party lines seem to agree that, in fact, HIT can, intuitively, have a positive impact on these components of healthcare reform. The RAND Corporation noted, in a well-publicized study of the costs and benefits of an interoperable HIT system, that a national health information network (NHIN) “that enables disparate health information networks across the United States to allow authorized users to easily and quickly share critical health information has the potential to enhance safety and dramatically improve the quality and efficiency of the national healthcare system” (Hillestad, Et al, 2008). These benefits are, however, predicated on the appropriate and sound implementation and

management of the HIT system at the provider level as well as the national system and governance level.

HIT will enable care givers to impact three main drivers to increase quality and safety in their practices: reduction of so called adverse drug events, preventative treatment and effective case management for patients with chronic conditions, and increased use of evidence based medicine and comparative effectiveness studies.

The circumvention of adverse drug events, in which a patient is administered an inappropriate medication leading to an adverse reaction, has received the greatest amount of attention to date – these events are both common and expensive. HIT systems can maintain a list of patient allergies and medical histories with which it can dynamically issue warnings to physicians in the process of prescribing drugs or providing care. It also might decrease the instance of miscommunication between care providers and pharmacies. A study examined by the Congressional Budget Office (CBO) found that 1.4% of hospital admissions are due to adverse drug events, 28% of which were avoidable. HIT systems with appropriate capability will flag situations liable to cause adverse drug events and enable prevention. Another study analyzed by the CBO paper indicated that HIT might reduce these errors between 50% and 90% (CBO, 2008).

HIT system use will also enable providers to administer preventative treatment and provide more effective case management for patients with chronic conditions. This is particularly impactful for those patients who visit multiple providers. Specifically, an interoperable HIT system will allow physicians from multiple practices to view a complete medical history for a



patient and manage care accordingly. Despite the high level of physician competence, a massive and fragmented industry is sure to let some patients fall through the cracks, which leads to escalating conditions often accompanied by increased medical costs and even death of the patient.

Finally, HIT systems can create the infrastructure necessary to increase the use of evidence-based medicine and comparative effectiveness studies for treatment. It is important to note that data, both that provided to private parties as well as that available for public access must be washed of all patient identifiers. However, data can be captured at a scale necessary to conduct rigorous empirical studies to compare the effectiveness and costs of treatments for a given disease. This can also be extended to prescription medications with a dynamically interactive system notifying physicians of more cost-effective generic drug treatments.

Intuitively, the access to data, at minimum, would enable physicians to use past evidence as aid in treating current patients.

The use of comparative effectiveness is probably a long-term goal, however, that will have little impact in the foreseeable future. Physicians, especially those that might stand to gain the most from the evidence based practice, spend most of their time treating relatively rare or distinct diseases. It would likely take many years to compile the data necessary on these rare diseases to make a meaningful contribution to diagnoses or treatments (Bell, 2009). However, that doesn't alter the potential benefit that will have positive incremental long-term effects on the quality of care in the United States.

Further, though diagnostic improvement is a long term goal, smaller goals can be realized in the nearer future. For example, the massive data repository can be used to evaluate quality at various health institutions. "Put simply, patients and taxpayers have the right-to-know the quality produced by every facility that receives taxpayer money and how and where scarce taxpayer dollars are spent" (Froque, 2009). Vast access to data would increase the likelihood of finding meaningful correlations because although a select few have access to data today, wider access would almost certainly yield greater results.

HIT will also enable the decrease of costs to providers as well as payers and, potentially, patients through increased efficiency and productivity. These gains in efficiency can be realized in a multitude of ways. EMRs would allow a physician to enter notes about a patient's condition or care directly into a computerized system, thereby making those records available to appropriate care givers at the time and point of care both within the home healthcare institution as well as others. This will create a substantially positive impact on the provider's bottom line as it relates to staffing in two major ways. First, many physicians use voice dictation for patient records, which is later transcribed into charts. Second, the EMR will decrease the amount of time spent pulling and synthesizing physical medical charts. An integrated HIT system will all but eliminate non-value-added activities substantially decreasing office work load and increasing utilization efficiency among physicians, nurses, and provider employees.

Also, increased availability of medical records beyond a patient's home care giver will help to decrease the number of redundant diagnostic tests, most specifically in laboratory and

radiology. Redundant tests arise when a physician does not have complete medical records or when the records available are incomplete. Most of the value in eliminating these procedures is captured by payers and patients, however, it does open capacity for the provider and potentially impact staffing and infrastructure needs. The CBO paper examined research by Bates and colleagues – it suggested that providers canceled 69% of lab tests when alerted that the test was redundant. This coupled with the suggestion that 9% of all lab tests were redundant suggests that diagnostic tests could be reduced as much as 6% (CBO, 2008). It is likely that similar gains can be made in radiology. Some studies have suggested, however, that HIT will not decrease the number of diagnostic tests, but might redirect physicians to different tests. Despite this real possibility, it is also important to consider that incremental gains can be made with effective HIT use and that redirecting tests can also contribute to higher quality care. An integrated HIT system can, additionally, prompt physicians to prescribe generic drugs rather than more costly brand-name drugs when proven comparatively effective. HIT can dynamically interact with physicians to recommend more cost-effective drug regimens or treatment types for patients. Physicians, currently, have little incentive to control prescription costs for patients; however the potential benefit remains with an effectively implemented HIT system. Moreover, there is evidence that suggests HIT can minimize fraud in a system wrought with it. This might be an area for large potential savings, though it has received little attention to date. James Frogue, in his testimony to congress, talked about companies like FedEx and UPS; he talked about large grocery chains and the massive and fragmented world of credit cards. The industries seem to be equally as complex as healthcare in many ways, yet have installed

technology that aids in the identification and prevention of fraud in the system. This might be largely due to the economic model of the businesses. A Government Accountability Office study in January 2009 suggested that healthcare, on the other hand, is being held hostage by fraud. It found that a full 10% of Medicaid claims in 2007 were improper (Frogué, 2009). These bits of fraud range from false claim submissions to double-dipping or coercion of care to reap government dollars.

Frogué suggested that the industry might “prevent dollars from reaching the hands of criminals and fraudsters in the first place by employing technology and tactics that are common in advanced, non-health industries” (Frogué, 2009). A fully integrated HIT system will put patient data online for public access. The largest payer, the US government, would also have access to all patient encounter data. This would enable greater transparency and public scrutiny to ensure that the services billed are those provided. It would bring cases of highly unusual billing to light and enable the industry to manage these cases more appropriately as well.

Further, HIT can enable better data sharing across jurisdictions. Consider the move of a sex offender – he or she is required to register immediately with local law enforcement and those who miss the deadline are flagged by sophisticated systems. Similarly, these criminal beneficiaries can be targeted and better managed with integrated access to data across states and jurisdictions (Frogué, 2009).

Finally, HIT systems can create benefits for both payers and patients. Payers will, intuitively, have greater insights into patient histories to more effectively manage risk. This can also

impact patient cost in the form of lower health premiums (Parente, 2009) and increase transparency into the patient's transaction.

The RAND study of 2005 extrapolates HIT savings on the national level and projects them into the future. It is important to note that potential savings discussed is with regard to the healthcare system at large. It found potential savings at about \$80 billion with a mean yearly savings of about \$40 billion, three quarters of which come from decreased length of stay and increased nurse productivity. This claim, however, relies on the assumption that that adoption rate jumps to 100% immediately and the mean is calculated over the next 15 years (Giroso, 2005). CBO concluded, on the other hand, that the RAND report was an inappropriate guide for potential savings because, though it measured potential impact of an integrated HIT system, it did not offer a *likely* impact. RAND appears to overstate the savings of HIT, specifically in length of stay savings.

Further, the impact of medical errors on malpractice costs is likely to be minimal (Sertich, 2009). The "vast majority of lawsuits arise not from technical mistakes like incorrect prescriptions but from diagnostic errors, where the physician makes a misdiagnosis and the correct therapy is delayed or never delivered" (Groopman, 2009). There is no evidence that suggests an increase in diagnostic reliability with EMRs. In fact, there is some evidence to the contrary – for example, the human error in computer entries has been shown to lead to new adverse events such as inappropriate drug doses due to mistaken weight as a result of keystroke entry errors.

A multitude of resources have conducted cost-benefit analyses of HIT systems and potential monetary benefits have ranged from \$0 to nearly \$80 billion annually. Some have called HIT the savior of the health system while some have called it little more than overly simplistic and unsubstantiated (Groopman, 2009). However, I'm not convinced that the question we ought to answer as a precursor for implementation centers on how much cost the provider can eliminate with HIT. Certainly, quantification of the likely savings is an important piece to the puzzle and can guide behavior. However, it seems that perfect quantification of costs has been overblown. They are estimates after all. Rather, cost should be considered as a benefit to the entire supply chain as a portion of what HIT can do to further efforts for healthcare reform through increased quality of care, decreased costs of care, and increased access to care.

### **Key Challenges That Must Be Addressed For HIT to Have a Meaningful Impact**

Most healthcare institutions have a relatively altruistic mission to provide high quality care but the risk in investing remains great due to the misalignment of incentives in embracing efficiency for providers. Simply throwing money at an irrational process will likely only make it more irrational (Bell, 2009). The federal government and health care system must address numerous challenges and key assumptions before moving forward with a full scale roll-out of the HIT program. High priority challenges for the successful implementation and ongoing management of HIT fall into two discrete buckets: standards and user adoption. Each of these areas breaks into additional sub categories discussed below. Perhaps the most basic and ground-level challenge is that of creating a set of standards for HIT implementation and management of patient held data.

## Standards

Several areas for standardization exist for the current HIT plan to reach full potential. In fact, continuing implementation without a clearly defined set of standards runs the risk of setting the cause of HIT back rather than promoting it (Sasse, 2009). Standardization is the basic necessity for interoperability and can be broken into three discrete parts: a unique patient identifier (UPI), infrastructure standardization and certifications, and privacy.

### Unique Patient Identifier (UPI)

The RAND Corporation, a nonprofit research think-tank, has introduced the RAND study, which puts forth a quite plausible explanation of what a successful HIT system and infrastructure would look like.

RAND suggested three possible ways to develop the infrastructure necessary for the US government and health care industry to develop an HIT system with reasonable chances of success. The status quo consists of a form of statistical matching – this will “string together enough identifying information about an individual to substitute for a UPI” (Hillestad, Et al, 2008). It matches attributes such as name, birth date, and social security number. RAND also, however, notes the shortcomings of statistical matching in that attributes can be misspelled, entered in different formats, and change over time. Additionally, these attributes are used repeatedly for multiple reasons such as mortgage applications and their use creates a risk of identity-theft. Rand concluded that statistical matching routinely creates both false-positives and false-negatives in the health care system, which often lead to all or some of the patient’s

medical record being discounted. In fact, published data suggests statistical matching errors to the tune of 8%, which trend higher in larger health systems (Hillestad, et al, 2008).

The other two options for infrastructure are a voluntary UPI or a mandated UPI. Congress, as yet, has not endorsed the use of UPIs, but for the sake of argument I'll discuss them as a potential option. A voluntary UPI would allow health care patients to register with health care providers and would cost about \$25 million for the first five years for the national organization issuing the UPIs plus the cost to providers and RHIOs for registration and administration of their databases, which RAND estimates at \$1.5 billion (for 300 million people). This cost would be incurred annually due to the requirement of annual renewal of a UPI account.

A mandatory UPI would increase the expense, but likely increase the efficiency and likelihood of success. Mandatory UPIs would require a central administrative organization that would guarantee uniqueness of the number. This central administrative organization would then have to issue an enhanced Social Security Number for each of the 277 million Social Security Cardholders. The Social Security Administration has estimated the costs of such an endeavor at \$3.9 - \$9.2 Billion. An alternative might be to issue a unique ID to all registered Social Security Cardholders, which the National Governor's Association has estimated at \$37 per ID for 300 million persons, or \$11.1 Billion. It seems reasonable, then, for the purpose of argument, to assume the highest estimated cost of \$11.1 Billion for system implementation. This is a one-time cost but does not, however, take into consideration the ongoing administrative costs of maintaining and updating the central system.



RAND notes that for the foreseeable future, a hybrid system of statistical matching and UPIs is necessary in both a voluntary and mandated UPI system because the nature of implementation is that not every patient will have a UPI assigned immediately. However, phasing a UPI into the system will incrementally increase the reliability of health records and eventually will virtually eliminate statistical matching errors. It has additional benefits for privacy and security in that a stolen social security number leaves a person much more vulnerable than would a unique ID number (Froque, 2009). Therefore, it seems clear that a mandatory UPI system will stand the greatest chance of success and provide for the greatest upside to be realized.

#### Infrastructure Standardization and Certifications

An industry standard is essential for interoperability because, although *any* digital health data can be valuable for providers, the value multiplies when it is “structured, standardized, and readily exchangeable among different information systems” (CCHIT, 2009). Paper records have the luxury of human touch to summarize a patient’s history either before or at the point-of-care. A computerized system, however, must have elements structured and coded and for interoperability both the sending and receiving systems must operate with the same standardized representations. This essentially means that for HIT implementation to reach its potential, a governing body, independent or otherwise, must define a common way of portraying data. This strategy should “standardize coding and classification systems” as well as “terminologies and ontology’s” (AHIC, 2009).

Historically, providers have exchanged data on an industry format called Health Level Seven (HL7). However, “until recently, there was no formal coordination to lock onto the same

version industry wide” (CCHIT, 2009). HL7 was “deployed in a range of versions, and even identical versions were implemented differently – confounding the aim of standardizing such messages” (CCHIT, 2009). Additionally, variation in coding caused problems in receiving data accurately and fully. Recent strides in laboratory have resulted in a single standardized HL7 format for general and microbiology lab results, though this standardization is not mandated. “Machine understandable documents using industry-standard terminologies and vocabularies enable the information to be not only displayed in a variety of ways at the point of care but also understood by the receiving system” (CCHIT, 2009). Further, as noted by the AHIC EHR Work Group, a feedback mechanism is essential to maintain continuity with the needs of clinicians as they uniformly implement HIT (AHIC, 2009).

This need for standards has prompted discussion of certification for EHR systems. The Certification Commission for Health Information Technology (CCHIT) is currently making strides in the development of certification standards for HIT vendors. However, there is broad disagreement about how these standards should be devised and implemented.

There have, traditionally, been two ways in which the market can achieve standards: *last vendor standing* or *governmental decree* (Sasse, 2009). Capitalism might lead us to a last vendor standing model scenario where HIT standards could play out much in the same way as the recent battle between Blu Ray and HD DVD. New innovations will jockey for position in the market place until one is accepted as the new standard among providers, which will essentially replace all others. This certainly fits with ARRA’s stipulation for greater competition and most would agree that such a free-market approach would likely increase innovation in the HIT

arena. However, given the economic misalignments for providers, it seems almost inconceivable that such an approach has any chance at success (Sasse, 2009).

Impulse will probably be a *governmental decree*, especially given current politics and the time table with which associated agencies have been given to work. This approach will consume the least amount of time and will ensure political control over the standards that are created.

However, competition is essential to spurring innovation and a *governmental decree* model runs the very real risk of hampering innovation.

Certainly government deserves a seat at the table and a strong role in setting standards – it is, after all, the largest payer in healthcare. However, as mentioned earlier, a full *governmental decree* could lead to a lack of innovation and an inferior product. Rather, it seems reasonable to assume that decentralization of standards is a better option with government playing a key role in a hybrid system combining *governmental decree* with market adoption through various vendors. Unfortunately, this approach, though most likely to be effective, also requires a slower roll out process and requires a great deal of time. Current politics lean toward immediate implementation and decrease the viability of this hybrid model.

CCHIT also noted, however, that requiring a means to transport the data makes sense only after EHRs can generate standard elements to share and process. Therefore, a standard method of transportation must be defined in parallel to the standardization of documents, which must also be happening within the provider networks.

## Privacy

“There is a need for clear and accepted guidelines for disclosure of electronic personal health information, particularly for secondary purposes (AHIC, 2009).” There is a relatively strong disconnection between current privacy laws (HIPPA) and the use of HIT. The federal government is currently addressing some of these issues and it is hard to predict what will come out of its efforts. However, it is important to note that privacy guidelines are essential for proper use and even user adoption due to the fact that providers are currently hesitant to invest in HIT because of privacy liability issues. Health care privacy law must be extended and amended to address the following issues laid forth by the AHIC EHR Workgroup:

1. Methods of patient identification
2. Methods of authentication
3. Mechanisms to ensure data integrity
4. Methods for controlling access to personal health information
5. Policies for breeches of personal health information confidentiality
6. Guidelines and processes to determine appropriate secondary uses of data
7. A scope of work for a long-term independent advisory body on privacy and security policies (AHIC, 2009).

## Adoption

Another key assumption HIT enthusiasts rely on for the realization of potential benefits is physician adoption. Some larger health systems, especially those that pay doctor salaries, can all but force physician compliance, but these cases are the minority. Further, roughly half of

the physicians in the United States operate in a small practice (Hillestad, et al, 2008). Adoption is hampered by two major factors: culture, of which lack of physician technological savvy is a part, and misalignment of economic incentives.

The first of many issues that must be considered for user adoption of an HIT system is the current culture in healthcare. This is a basic issue the plan faces because user buy-in is essential to success.

HIT will affect a multitude of changes in hospitals and physician practices. Job descriptions will change and offices and workflows will be redesigned. Research suggests that most providers that utilize HIT as a turnkey solution that can be plugged in and immediately work to potential fail (Bell, 2009). Rather, substantial strategic and operational planning must take place in an effort to implement to meaningful and effective use. Physician offices need guidance and support as they embark upon the EHR selection, implementation, and adoption process (AHIC, 2009). Redefinition of culture in health care is essential, in some sense, and two major cogs in achieving this redefinition are a well developed HIT workforce and solicitation of Voice of the Customer (VOC) data to improve HIT systems and processes.

Technology use in the health care market space has been quite limited in the past and providers will require help from an HIT workforce to reorganize workflow, redirect staff, and attempt to minimize disruption of patient care during the implementation process and forward (AHIC, 2009). Proper support is a necessity as it relates to user adoption because a physician must understand the system and reach a level of comfort with EHRs before using it to potential. David Collins of Healthcare Information and Management Systems Society (HIMSS) recently

warned that risks are sometimes created not by the systems themselves but by the way they are installed and the way staff is trained.

This introduces an additional cost of implementation that centers on work flow disruption and other ancillary impacts. Consider, for example, the case of the Department of Critical Care Medicine/Transport at the Children's Hospital of Pittsburgh. Data analysis revealed that following the implementation of a computerized physician order entry (CPOE) system mortality rates increased slightly more than 1% (Han, et al, 2005). This coincident is likely due, at least in part, to the effects of the CPOE learning curve slowing time-sensitive treatment. This impact can also be potentially attributed to the lack of technological savvy among many US physicians.

Lack of physician tech savvy will hamper adoption in two ways: lack in trust of the system and/or lack of ability to use it appropriately and work flow disruption, which is, to date, an unaccounted cost. In fact, one study found that 10 of 14 physicians abandoned paper records completely following EHR installation (Miller, 2005). However, this suggests that nearly 29% will not immediately adopt the new program – though it is likely over time that this number will dissipate. Those who do not immediately adopt probably made such a choice due to lack of trust or understanding or do not have the employees in place to implement the system to its potential.

A properly equipped HIT workforce can help to curb these numbers by increasing system understanding among physicians and promoting appropriate use. Early steps have been taken in this direction. The HITECH law has provided ONCHIT with \$2 billion to begin putting the support systems and infrastructure in place. It also authorizes grants for installation, training,

and implementation funds to providers (Blumenthal, 2009). These funding efforts must carry through to ease the burden on physicians to actualize the potential benefits of the HIT plan.

Additionally, physician adoption can be spurred by increasing the integration of physicians into HIT design. Voice of the Customer (VOC), a relatively basic principle of Six Sigma, can be used in the design of HIT systems to target specific operability desired by physicians and other users. Information, for example, should be presented in such a way that users are actively using it to potential. Rather than a pop-up box that is instinctively closed by physicians, information ought to be presented in such a way that it enables the “aha moment” in a diagnosis or treatment schedule (Bell, 2009).

Finally, in an effort to change healthcare culture from the ground up, the government might consider immediately offering additional or greater grants to those academic institutions that use cutting edge HIT (Tierney, 2009). This will build the trust and ability of young doctors to work with HIT and might actually make HIT an implicit requirement for those hospitals hoping to recruit young talent from medical schools. A basic change at the lowest level (physicians in medical school) could help increase the incentives for hospitals to install and effectively use and manage HIT and would also make a core change to the culture at large.

### Misalignment of Incentives

The banking industry has had great success with the implementation of IT and interoperable data repositories. ATM cards are an example of a limited total data set and it is mediated by those with an economic interest in the chain. Healthcare is seemingly different because there

is a plethora of data from diverse places no and necessity for a home provider to help fix a problem.

Despite the altruistic nature of healthcare providers in the US, a significant misalignment of economic incentives exists as it relates to HIT. A fee-for-service agency, by its very nature, has little interest in incremental efficiency because it essentially destroys volume and potentially profitability. In the case of a hospital, particularly outpatient, someone pays for the service being rendered whether necessary or not. System-wide waste, though an obscene cost to some, is also someone's revenue – in this case, the provider's. Many radiologists will admit that a large number of radiological tests are redundant due to a lack of information sharing (Sasse, 2009). An appropriately utilized HIT system will likely reduce this number substantially and, though it opens capacity for the provider, it also introduces additional risk because the current volume would essentially be destroyed. The HIT plan is, more or less, agreeing to pay people to do something they do not have an economically aligned interest in doing – it is a government sanctioned bribe.

Additionally, patients and payers are the primary beneficiary of the cost savings in the form of lower prices and higher quality, yet providers bear the burden of cost for implementation and ongoing management of HIT systems. It seems counter-intuitive given the current structure of the healthcare industry that a hospital or physician group would implement HIT in accordance with the plan that effectively limits future revenues. Despite the fact that HIT could impact cost savings for the healthcare system at large, many physicians might not be able to reduce expenses or increase revenue sufficiently to pay for it (CBO, 2008).



Smaller physician offices, in particular, may not see internal savings to justify HIT. Small practices are not likely to see reductions in staffing costs associated with paper medical records. The person(s) who are typically responsible for chart maintenance, in these settings, also serve other purposes and, therefore, staffing costs will likely remain relatively fixed (CBO, 2008).

Both small and large facilities also suffer from the loss of revenue from the aforementioned duplicative diagnostic testing. These tests, in lab and radiology, are often paid separately by health insurance plans and reducing the number of tests will likely reduce the physician's income. It seems more reasonable, then, for the physician to invest in new equipment rather than HIT that destroys his or her volume. The implementation carrots and sticks will probably lead these physicians to implement HIT anyway, but there remains no incentive to use it to potential.

The way healthcare delivery and financing are currently organized will continue to constrain the effort of HIT unless materially changed. Payment methods, in most cases, do not reward providers for controlling or reducing costs and in some cases actually penalizes them for doing so. Therefore, to combat this misalignment in financial interest it seems that the fee-for-service business model of healthcare needs to be changed. This could be done by realigning payment reform to include reimbursement for providing a full suite of services that help the patient get to his or her desired state. The cost of the HIT system could then be baked in to the new payment structure while aligning the economic incentives for physicians to provide high-quality cost-efficient practices. Migrating to a more aggressive performance based

compensation method will advance the cause of HIT serving as a means to an end and also allow assessment based on quality measures and other metrics (Sasse, 2009). This might create a trickle-down effect for patients to take a more active role in managing health history and also managing lifestyle choices by increasing the incentives for physicians to create real results.

Additionally, some HIT functionalities will require incremental work and perhaps staffing. So, for example, if a state or national board requests information or data there should be a vehicle for reimbursement to the provider. This would provide some incentive to the provider to utilize the technology to full potential without suffering additional cost.

### **Conclusions**

All of these stated points come together to urge congress, the Obama administration, and the healthcare industry with several key messages. HIT can, if implemented and managed effectively, prompt the healthcare industry toward health reform; \$80 billion annually is quite probably overstated, at least for the foreseeable future; implementation of HIT should move forward in a methodical way that ensures specific conditions are met to increase the likelihood of success; speed to implementation should be tempered by the incentives of quality.

Implementation that is rushed carelessly forward for the sake of having HIT runs a great risk of setting the initiative back rather than advancing it. Current politics, however, have left us with a timetable that begins incentives (carrots) in 2011 with full scale interoperability expected along with the disincentives (sticks) in 2016. This timetable probably dictates a hybrid of best practices to move the process along and hopefully not at the expense of the HIT initiative.

There are a few key ideas to keep in mind as we move forward with the implementation and HIT in the United States. As stated earlier, the RAND report has probably overstated the potential gains of \$80 billion annually. It seems likely that this was, in fact, intentional – the RAND report serves more as a glimpse of where we could be with a full scale implementation, not where we will be. The myriad of studies and reports purporting to quantify likely HIT impact are most important in the sense that they bring to light the many challenges that the healthcare industry will face moving forward with implementation. HIT is here to stay and, especially given current politics, the discussion of cost to implement and manage HIT as compared to the potential and likely benefits to providers seems moot beyond the obvious implications of government reimbursement. Rather, we should consider the conditions necessary for HIT to be a truly game-changing solution that enables healthcare reform – that is, increases quality and safety of care, decreases cost of care, and increases access to care. I have examined two major categories with multiple subcategories in which significant ground work should be completed for HIT to make a substantial impact and, indeed, serve as a means to the end of achieving healthcare reform.

Standards are an essential piece to the puzzle. The first condition that enables HIT is the unique patient identifier. This can be implemented in several ways and the most impactful way is for the government to issue mandatory UPIs, which is a lengthy process. It requires significant investment and universal participation. It is also likely that this approach would require a phasing model in which portions of the population would receive UPIs at various times over the next few years. This is expensive, but doable by 2016 when full implementation and integration

is slated to be online. HIT can be impactful without a full scale UPI implementation, however until UPIs become the standard HIT will not reach its full potential.

Infrastructure standardization and certifications are an even more essential condition that must be met for HIT to reach potential of impact, or perhaps any impact at all. There must be standard ways of transmitting and receiving data for interoperability to be a reality and as previously discussed, *governmental decree* or *last vendor standing* are traditionally the way that standards have been created. A decree of standards from the government runs the risk of hampering innovation but is certainly the most viable option for current time tables. It seems realistic for standards to be in place relatively quickly if defined by the largest payer – the government. However, a hybrid model coupling *governmental decree* with an opportunity for vendors to innovate and create superior products seems to be the most likely for HIT to reach greatest potential. This process is more time consuming and will likely slow adoption in the short-term, which will severely limit the viability of being fully interoperable by 2016. This should probably be the top priority for policymakers. A set of standards that the government, vendors, and users can all buy in to will likely jolt the adoption of HIT systems, while the lack of standards, which we are now seeing in action, will retard HIT adoption.

Finally, privacy laws must be amended and tailored to encompass HIT and the new technologies in healthcare. Government teams are in the process of adjusting privacy law currently and it seems likely that these laws will be of little hindrance to the HIT movement. Given current trajectory, it is likely that privacy laws will be in place to not only allow for, but perhaps incentivize movement toward HIT systems in the near future.

The second major area for consideration is stakeholder adoption. This consists of two subcategories – culture and misalignment of incentives. These conditions are harder to change and time tables are harder to estimate.

Culture can be approached in three major ways: a well equipped HIT workforce to help with selection, implementation, and training in physician offices and hospitals, a strong movement for VOC data to integrate physicians' opinions and ideas into innovative new HIT technologies, and potentially a incentive funding package for medical schools that fully integrate interoperable HIT systems to prompt a more technological culture among young doctors. It seems likely that an HIT workforce can be created quickly to begin helping institutions with HIT decisions and there is funding currently available to begin this initiative. It is probable that this HIT workforce will be online by 2011 or perhaps sooner as adoption begins to spread among health institutions.

Further, physicians are currently making contributions to HIT and the incorporation of VOC data can certainly be online and working in the near future. However, it is important to note that this should be an ongoing mechanism and that the data will become increasingly valuable when there are a larger number of HIT systems being meaningfully used because it will both increase the data set and increase the understanding of the system and how it works for physicians. The government and HIT vendors must establish a formal feedback mechanism with which to move forward and there is little standing in the way of such a mechanism. Finally, medical school funding is an approach more tailored to a slower roll out of HIT that targets healthcare culture at a systemic level. It is unlikely, given the carrots and sticks already outlined in ARRA, that such

a funding initiative will take place. However, it would probably have a profound impact on the ability of physicians entering the work force to operate an integrated HIT system and would increase incentives among providers to have these technologies available. This would not, probably, have such a profound impact by 2016 because few graduates by that time will have the opportunity to experience a full medical school career with HIT systems in place.

Finally, the misalignment of incentives for healthcare providers to embrace HIT and strive for greater efficiency must be addressed. The fee-for-service model of healthcare in the United States does little to promote HIT adoption and should probably be changed to a more aligned fee-for-performance or reward-for-quality type payment structure. This is the most essential of conditions for the success of HIT. Unfortunately, it seems rather unlikely that this change can happen by 2011 or even by 2016. This is due, in large part, to the fact that the potential change hasn't gotten nearly enough attention. The payment structure change is a complex and political change that ought to be a precursor to the HIT implementation. However, the current timetable assigned to HIT implementation does not include the primary phase of payment model change. Therefore, it seems unlikely that this will be addressed by 2016; and despite the carrots and sticks related to meaningful use of the HIT system, the misalignment of incentives might actually provide disincentives for meaningful use and even lead to greater instances of fraud. I am hopeful that this will be addressed at some point in the near future, even if in parallel to the HIT initiatives. Later changes to the payment model will lose the benefit of spurring adoption, but it is possible that the changes could positively impact the meaningful use of HIT beyond 2016.

The Obama administration is on the right track and I think the HIT initiative deserves the support of taxpayers, healthcare professionals, and other stakeholders. The disincentives will probably drive HIT adoption if the incentives do not (Anderson, 2009). But congress may have jumped the gun with the provisions set forth in ARRA. A timeline for full implementation and interoperability was outlined and enacted with little consideration for the conditions necessary in healthcare to enable HIT to be the game-changing disruption to the system we all hope it is. One can hardly blame them given the inability of most Americans to delay gratification. Voters expect action and action has been taken. However, this has increased the stress level on the system because new conditions must be met if we expect HIT to have the potential positive impact we think it can and they must now be met on a shortened timeline. It is probably safe to say that an interoperable HIT system will be up and running by 2016, but we will be far short of the potential savings outlined by RAND and other studies of potential HIT impact. Potential impacts will be realized only after all the appropriate conditions have been met by the system at large and even 2020 might be an overly optimistic date for that.

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