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A Critical Analysis of the Need for Statewide Networks for Electronic Medical Records

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**A CRITICAL ANALYSIS OF THE NEED FOR STATEWIDE NETWORKS FOR
ELECTRONIC MEDICAL RECORDS**

by

Kimberly A. Christian

B.A., Colorado Christian University, 2005

A Research Paper
Submitted in Partial Fulfillment of the Requirements for the
Master of Public Administration

Department of Political Science
in the Graduate School
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RESEARCH PAPER APPROVAL

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Masters of Public Administration

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TITLE: A CRITICAL ANALYSIS OF THE NEED FOR STATEWIDE NETWORKS
FOR ELECTRONIC MEDICAL RECORDS

MAJOR PROFESSOR: DR. ADRIAN VELAZQUEZ

Health care practitioners struggle to meet the demands of increasingly complex patient care, as well as care coordination and reporting. An integrated, electronic system is needed to input, track, store, update and share current and complete patient information in real time.

Recent federal mandates regarding health information technology and use of electronic medical record (EMR) systems are impacting virtually every inpatient and outpatient care facility. Because EMR system startup costs are high, federal incentives for implementation and use are available until 2015, when penalties will start to be imposed if full implementation isn't complete.

While EMR systems offer a multitude of benefits to health care practitioners, the ultimate goal of EMR systems is to develop statewide and regional health information exchanges, enabling health care facilities to share data with the public health sector; in turn, both parties can gain information they would not have access to otherwise. The positive implications for population health are extensive, as large amounts of data can be used to derive information about health trends, epidemiology and other health-related population information that is not readily available today.

An effort this large predicates government involvement. The government needs to take a vested interest in the structure, implementation requirements and education required to successfully use EMR systems to their fullest potential.

In order for EMR systems to be widely usable and interoperable across an entire state, universal standards regarding health information exchanges (the way information is encoded, shared, accessed and used) must be developed. The federal government is in a unique leadership position to make this happen. Beyond making rules and laws, the government needs to enable states to develop these complex systems—by underwriting startup costs, sharing best practices, promoting stakeholder buy-in, helping states develop business plans for sustainability, and more.

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CHAPTER 1: INTRODUCTION

As growing health care costs continue to try the patience and pocketbooks of American citizens, our nation's legislators have a responsibility to examine the most promising methods of reducing costs while maintaining high-quality health care. Although the U.S. spends more per capita on health care than any other country, that cost does not necessarily yield better patient outcomes (Hunkar, 2009). An aspect of cost containment dominating the energy and interest of legislators is that of implementing electronic medical records.

Americans are a mobile society, and their medical records need to follow them. Military families may move every two years. The average American reportedly moves "11.7 times in a lifetime" (Geographic Mobility/Migration, 2009). More than 120 million people (45.9% of the population) changes residence every 15 years (Schachter et al., 2009). New homes translate to new places where people receive treatment—creating disjointed medical histories strewn across the country.

Health care consumers deal with this problem in various ways. Some people simply trust that their health care practitioners will obtain the right records when needed. Other people take matters into their own hands by keeping their own health record, like Donna Brown of Gary, Indiana. Whenever she travels with her husband, Melvin, she totes a five-pound satchel of his medical records—a mishmash of paper documents and CDs from more than half a dozen physicians and two hospitals (Taylor, 2010). This seems to be the best way to communicate Melvin's full history of chronic conditions to whoever treats him.

The problem appears simple enough: medical records stored on paper cannot be collected, coordinated, shared or analyzed easily (Hillestad et al., 2005). As a 2006 study

commissioned by the National Institutes of Health discusses, EMRs are designed to use one set of data many times (Mitre Corporation, 2006). If any caregiver in the state could log onto a computer and immediately access Melvin's complete medical history, wouldn't that be safer, more efficient and more effective? The short answer is "yes." But accomplishing that is a thorny issue that sometimes pits legislators and practitioners against each other.

CHAPTER 2: FEATURES, BENEFITS AND CHALLENGES OF EMRs

Dr. Lawrence Weed first proposed the concept of the electronic medical record (EMR) in the late 1960s; his work led to the first EMR system in the 1970s (Pinkerton, 2006). Since then, hospitals and physician practices have implemented various components and capabilities of EMRs; however, those components lacked integration (the ability to “talk” with each other), as well as portability—creating a fragmented, incomplete system for gathering and using health information.

Dr. David Blumenthal (2009), the National Coordinator for Health Information Technology, best describes the benefit of this technology:

My personal belief in this transformation is not based on theory or conjecture. As a primary care physician for over 30 years, I spent the first twenty shuffling papers in search of missing studies and frequently hoping, during middle-of-the-night emergencies, that I knew enough about patients’ medical histories to make good decisions. All that changed when I began to have access to patients’ electronic medical records. It made me a much better doctor. I would never go back, and neither would the vast majority of American physicians who have made the leap into the electronic age (Blumenthal, 2009).

This research paper sets forth the argument that electronic medical records (EMRs) are a valid way to reduce health care costs and provide numerous additional benefits; thus, the government should support this effort at the highest possible levels. EMR systems and the technology behind them offer the health industry many capabilities, as well as controversies.

Features

An EMR system should perform five broad functions: 1) contain the *entire scope* of the patient's medical history and treatment (Electronic Medical Records, 2005); 2) *connect* practitioners with medical records in multiple locations; 3) provide *real-time access* to authorized users anywhere (Taylor, 2010; Christian, 2010); 4) *integrate* records from all pertinent sources (Electronic Medical Records, 2005); 5) offer *clinical decision support*, which includes many facets of patient care, such as e-prescribing (digital prescriptions sent directly to pharmacies), flagging potential drug interactions and allergy alerts, suggesting lab tests based on the patient's constellation of symptoms, suggesting preventive care, generating patient reminders, and much more (Reducing and Preventing Adverse Drug Events, 2001; Vanac, 2010; Mitre Corporation, 2006).

Benefits

EMRs promise extensive benefits. EMRs offer completeness of information while providing accurate, complete and portable data (Taylor, 2010). The most frequently cited (and potentially most controversial) benefit of EMR systems is its *cost savings*. Cost savings to practitioners are realized in many ways: in reduction of administrative time spent on paperwork; turning former file storage space into clinical treatment space, and virtually eliminating costs for transcription services. EMR systems also can *automate and streamline workflow processes*, while eliminating costly medication errors and duplicate tests (Electronic Medical Records, 2005), providing better-coordinated care.

While some people dispute whether EMRs lead to better health care, care is delivered in a more timely fashion with earlier interventions when EMR systems are in place. It is my position that EMR systems do enable better health care because of its capabilities.

Perhaps the largest potential benefit, which is the major finding of this research paper, is the implications of EMR systems for *public health*. EMR implementation provides access to data sources not currently available to the public health sector. The potential for data mining EMRs allows providers to spot trends in population health, which has major implications for public health monitoring. The ability to spot trends can influence public program administration and increase the effectiveness of resource allocations.

Challenges

With any process change as large as instituting EMR systems comes many challenges. The single largest barrier to EMR implementation is cost (Banger, Dullabh, Eichner & Kissam, 2010). Additional challenges include underwriting initial and ongoing operating costs (Congressional Budget Office, 2008; American Hospital Association, 2005), implementing software, gaining stakeholder buy-in, training all users, and accommodating a potential short-term productivity loss during startup (Hillestad, et al., 2005).

Interoperability—getting inpatient and outpatient facilities to share electronic records with each other—is a separate, unique challenge. On a broader scale, health information exchanges face the challenge of making sure the records can “talk” to different facilities throughout a statewide or regional network.

The final challenge of EMRs is its “unknowns.” The federal government finalized its rules regarding “meaningful use” criteria and other EMR standards on July 28, 2010. Those rules became effective September 27, 2010—yet many facilities are already in some phase of implementation—to avoid penalties of not having a fully operational system by 2015. Thus, it is important to obtain a system that is 1) highly usable now, 2) easy to learn and is

3) flexible and scalable to accommodate changing practice needs, regulations, and reporting requirements (Armijo, McDonnell & Werner, 2009).

CHAPTER 3: THE RISING COSTS OF HEALTH CARE

A widely publicized quote from President Obama on March 5, 2009 states: “By a wide margin, the biggest threat to our nation’s balance sheet is the skyrocketing costs of health care” (FOXNews, March 5, 2009). The health care debate has perplexed leaders over several administrations as they searched for ways to reduce these costs. But Obama’s words struck a chord with many American citizens.

The general public is equally concerned about the cost of health care in America. A recent CNN poll stated that 80% of Americans are satisfied with their quality of health care, and almost as many are happy with their health care coverage; but more than 75% are dissatisfied with the *cost* of health care in the United States (CNN, March 19, 2009).

Obama’s push for health care reform includes the implementation of statewide use of electronic medical record systems (DesRoches et al., 2010). This vision began during George W. Bush’s administration with a series of policy initiatives launched starting in 2006 (Halamka, 2006). Those efforts culminated in February 2009 when the Health Information Technology Economic and Clinical Health Act (HITECH) was enacted as part of the American Recovery and Reinvestment Act (ARRA) (CMS EHR Incentive Program, 2010). ARRA includes a \$787 billion economic stimulus package, with up to \$24 billion of that earmarked for assisting health information technology departments with EMR implementation (CMS Information Related to the Economic Recovery Act, 2009).

The HITECH Act calls for the Centers for Medicare & Medicaid Services (CMS) to play a role in three areas. The first involves establishing incentives for implementing electronic health record systems. To delineate which entities would be eligible for these incentives, CMS had to define “meaningful use of certified EHR technology,” which

addresses the scope and practice of using EMRs (CMS Information Related to the Economic Recovery Act, 2009). Those standards went into effect September 27, 2010. CMS is also charged with standardizing implementation and certification criteria for EHR technology (CMS Information Related to the Economic Recovery Act, 2009). Finally, CMS is also working to maintain HIPAA standards with EHR technology (CMS Information Related to the Economic Recovery Act, 2009).

The Agency for Healthcare Research and Quality (AHRQ) supports EMR implementation. Its e-newsletter recently cited the National Coordinator for Health Information Technology as saying, “A nationwide electronic health information exchange will provide the best opportunity for each patient to receive optimal care” (Patient Safety and Health Information Technology E-Newsletter, 2009). The article emphasizes how complete medical records bring greater security and reliability to the profession and reduce system-wide costs, concluding that this effort delivers results that help “avoid expensive or prolonged hospitalization from delayed or ineffective treatment, avert costly and sometimes fatal adverse events and unnecessary procedures, and can help to eliminate the onset of disease by better informed management of each patient’s health” (Patient Safety and Health Information Technology E-Newsletter, 2009).

Locally, health care providers such as the Marshfield Center (Marshfield, WI) are also realizing less obvious, but equally important benefits from implementing EMRs—namely, increased quality improvement (Electronic Medical Record-Facilitated Care, AHRQ website). This system tracks performance information, which enables the center to gauge quality improvements such as reduced hospitalizations, medication errors and administrative costs. Marshfield’s system offers providers reminders on needed tests and

preventive services, flags high-risk patients with gaps in care, provides e-prescribing and schedules upcoming appointments (Electronic Medical Record-Facilitated Care, AHRQ website).

The U.S. Department of Health and Human Services Centers for Disease Control and Prevention National Center for Health Statistics has highlighted another way in which EMRs can help contain costs. Its 2006 report noted that doctors ordered duplicate tests when the first set of results was not available at the time of the medical appointment. These unnecessary costs could have been avoided by utilizing EMRS (Friedman, 2006).

CHAPTER 4: IMPLEMENTATION RATES AND COSTS

While implementation rates and costs of EMR systems are important to measure to determine industry adoption, accurate, up-to-date figures are elusive. Implementation rates and costs vary greatly between doctors' offices and hospitals. They also vary by study, as each study defines different benchmarks, including tangible and intangible benefits.

Cost analysis is complicated because no consensus exists “on what functionalities constitute the essential elements necessary to define an electronic health record in the hospital setting” (Jha, DesRoches, Campbell, et al., 2009, p. 1630). This is important to acknowledge in assessing reports of EMR system implementations. Implementations also are almost always done in stages, and few facilities implement identical systems.

Despite federal efforts underway to define and gauge implementation, standards are yet to be finalized. HIMSS has established eight stages of hospital implementation for EMR systems, with recommendations of which stage to target for full implementation of 2011, 2013 or 2015—but the federal government has not yet formally adopted those guidelines (HIMSS Analytics, 2009).

It is important to note that, while examples and studies help give a frame of reference to grasp EMR system implementation rates and costs, generalizations are problematic. Each facility's needs vary, depending on the facility size, staff and system-specific features. It is not a direct relationship; for example, an EMR system for a 25-bed hospital will not cost only a fourth of that for a 100-bed hospital.

Furthermore, everyone defines savings in their own way, depending on what is most important to them. Some facilities report savings on nurse administrative hours or reduced outsourcing costs. Similarly, cost data can differ. Some facilities separate training costs

from total system costs. While some facilities report short-term loss of productivity, others report efficiency savings instead. What this means for this paper is that the studies and examples described should be reviewed individually—through each one’s rubric. Without national standards for such reporting, the numbers are valuable, but not generalizable.

All the numbers that follow were reported before HITECH was enacted in 2009 and before CMS’s first stab at “meaningful use” was penned. However, these studies depict the most current information available regarding implementation costs and rates. At the time this paper was written, no post-HITECH studies of implementation rates had been published. Studies of this magnitude are extremely expensive, requiring at least a year of data collection, plus many more months to analyze. We can expect that implementation rates will jump significantly in the next two years, reflecting HITECH’s influence. While we look forward to such a study, we do not have the advantage of seeing such data yet.

Implementation rates and costs in physicians’ practices

That being said, four prominent, recent studies exist regarding implementation rates and costs for physician offices. A 2007 study by the Healthcare Information and Management Systems Society (HIMSS) found that “23.9 percent reported using full or partial electronic health records in their office-based practice” (HIMSS, 2007, p. 2). This study defines a “complete EHR¹ system” as implementation of four key functions: e-prescribing, computerized provider order entry, automated reporting of test results, and physician documentation (HIMSS, 2007). Based on that definition, HIMSS reported that only 9.3% of physicians had implemented complete EHR systems.

¹ No standardization exists regarding use of the terms “EMR” and “EHR.” This paper uses “EMR” except in cases where reports specifically use “EHR.” The two are interchangeable in this paper.

A May 2008 study by the Congressional Budget Office (CBO) cites a 2006 study by the National Center for Health Statistics, which says that 12.4% of doctors use a “comprehensive EMR system” (Congressional Budget Office, 2008). That CBO report cites the few available studies reporting total costs, stating, “Total costs for office-based EHRs are about \$25,000 to \$45,000 per physician” (Congressional Budget Office, 2008, p. 17). In addition, estimates of annual costs for operating and maintaining the system, which include software licensing fees, technical support, and updating and replacing equipment, range between 12% and 20% of initial costs, or \$3,000 to \$9,000 per physician per year (Congressional Budget Office, 2008).

The April 2009 issue of the *New England Journal of Medicine* (NEJM) begins its discussion of the implementation rates of EMR systems in physician offices by stating: “using a well-specified definition of electronic health records in a recent study, we found that only 17% of U.S. physicians use either a minimally functional or a comprehensive electronic records System” (Jha, DesRoches, Campbell, et al., 2009, p. 1629).

Finally, the most recent report, published in October 2009 by the U.S. Department of Health and Human Services, cites that “physician adoption of clinical EHR systems is still estimated at less than 10 percent nationally” (Armijo, McDonnell & Werner, 2009, p. 5). This 2009 report focuses on usability as a definition of implemented EMR systems, defined by the National Institute of Standards and Technology (NIST) as “the effectiveness, efficiency and satisfaction with which the intended users can achieve their tasks in the intended context of product use” (Armijo, McDonnell & Werner, 2009, p. 7).

Implementation rates and costs in hospitals

Reported rates for implementation of EMR systems in hospitals differ as well. The 2009 *NEJM* article notes that, while most people agree that the use of HIT offers “more efficient, safer, and higher-quality care,” no reliable estimates exist on the “prevalence of adoption of electronic health records in U.S. hospitals” (*NEJM*, 2009, p. 1). The *NEJM* study surveyed 63% of all hospitals in U.S. and found that only 1.5% had truly comprehensive EMR systems in place; an additional 7.6% had “basic” systems (*NEJM*, 2009).

The American Medical Association (AMA) released a report in 2005 that highlights the cost of hospital HIT investments, stating, “The median annual capital investment on IT was over \$700,000 and represented 15% of all capital expenses” (American Hospital Association, 2005, p. 10). AMA’s calculated operational costs—those to run and maintain the system per year—were even higher: “\$1.7 million, or 2 percent of all operating expenses” (American Hospital Association, 2005, p. 10). AMA language declares that full implementation is considered “high use” and that about 10% of hospitals are at this level of implementation (AMA, 2005). Finally, the report noted that larger hospitals with more resources and capital do not necessarily spend proportionally more on EMR systems than smaller hospitals do (American Hospital Association, 2005).

The implementation studies just discussed illustrate several key points. 1) Implementation rates prior to the HITECH Act were low ($\approx 10\%$) in both physician offices and hospitals. 2) Implementation costs are somewhat unique to each facility and do not always depend on institution size. 3) Maintenance costs are more significant than the initial purchase; both types of costs must be considered. 4) Standardization in measuring

implementation rates and costs is needed to directly compare facility figures to each other. This final point is integral to understanding the premise of this research paper. If universal measurement standards are needed, then government involvement becomes necessary.

Detractors of EMR Systems

An April 2010 article in *MedCity News* discusses the controversy over EMRs. One perspective is that the HITECH Act provides incentives for implementing EMR systems when it should promote and fund improvement and innovation of medical practices as a whole (Vanac, 2010). Other organizations favor HITECH because incentives motivate health care institutions to “raise care quality while lowering its cost” (Vanac, 2010, p. 1).

Despite the sentiment for improving the overall way that medicine is practiced, implementing EMR systems is more readily actionable and quantifiable—and a number of national studies show that EMR systems *do* save money. Richard Hillestad headed a group of RAND researchers that spent more than a year studying this. Hillestad, James Bigelow, Anthony Bower, Federico Girosi, Robin Meili, Richard Scoville and Roger Taylor (2005) wrote, “Over fifteen years, the cumulative potential net efficiency and safety savings from hospital systems could be nearly \$371 billion; potential cumulative savings from physician practice EMR systems could be \$142 billion” (Hillestad et al., 2005, p. 12). However, because EMRs have significant startup costs, some people are apprehensive about pouring their resources into an unproven endeavor.

Despite an EMR’s startup costs, Hillestad says those can be regained quickly with the savings it produces (Hillestad et al., 2005). His modeling shows “at 90 percent adoption, we estimate that the potential HIT-enabled efficiency savings for both inpatient and

outpatient care could average more than \$77 billion per year (an average annual savings of \$42 billion during the adoption period)” (Hillestad et al., 2005, p. 5).

Learning a new system can cause potential workflow disruptions and loss of productivity. Doctors’ offices are particularly worried about being overburdened during implementation (Hillestad, 2005). Training plans must anticipate and compensate for any potential short-term reduction in productivity.

Some EMR critics are concerned about technology. A *Reuters* article (Dobbyn, 2009) notes that administrators have many options when choosing EMR software, and no vendor has emerged as a clear leader in this area (Mitre Corporation, 2006). However, that should change over time, as the standard life cycle of software is that a few vendors eventually choose to remain in the market, becoming industry “standards” (Mitre Corporation, 2006).

In addition, some critics note that as of today, there is no single best way to encode, send, “unpack” and share information in the most secure manner (Dobbyn, Heavey & Wutkowski, 2009). Without this standard, an EMR’s added expense can be a hard sell.

While detractors’ concerns regarding standardization are still being addressed, utilizing EMRs in health care practices and hospitals makes dollars and sense. Dr. John Halamka, CIO of Harvard Medical School, writes that EMRs and data-sharing capabilities “improve quality, reduce costs, and enhance workflow” (Halamka, 2006, p. 3). He says that EMRs also create a “community of clinical collaboration, fostering the adoption of new knowledge and best practices” (Halamka, 2006, p. 3).

A “community of clinical collaboration” alludes to well-established, widespread use, and a study performed by DesRoches et al. appears to support this. DesRoches found that current investments in HIT may not yield immediate expected results—*but* the results may

not be apparent until “a majority of providers use them and until there is sustained effort to create the infrastructure for exchange of data among physicians and hospitals” (DesRoches et al., 2010, p. 644). Practitioners must do more than obediently invest in EMR systems; the technology’s true value and potential cannot be achieved without high usage rates. This harkens to the government’s “meaningful use” guidelines.

While some studies like DesRoches’ do not forecast immediate results, it’s important to note that widespread adoption and use of EMRs locally—let alone statewide—has not yet accrued enough collective history to accurately predict the technology’s long-term cost savings and benefits. However, most authors agree that EMRs will provide some measure of cost savings and increased productivity—with the potential for much greater results.

EMRs’ Effects on Health Care Costs

A number of confounders exist in measuring cost savings of such systems. To some extent, all physician practices, health care institutions and even departments or specialties within health care organizations have different needs and will implement a somewhat different system based on those needs (Mitre Corporation, 2006). Implementation may occur in phases, and the point at which cost savings is calculated will vary. This contributes to the complexity of measuring savings and return on investment. If the system is not yet fully operational or has not been in use for more than a few months, cost savings will largely be based on projected future savings (based on certain variables) (Jha, et al., 2009).

Despite the legitimate concerns regarding cost and feasibility, a 2000 article from *Accelerating Change Today* underscores the importance of utilizing health information technology for patient safety. In this case, a Boston physician’s written prescription for chemotherapy led to an overdose, and eventually, the death of a 39-year-old patient. This

led to five years of investigations, where the hospital faced scrutiny over whether the systems had failed or simply were not there in the first place. Ultimately they determined the need for a secondary system to double-check physician accuracy. (Paul, 2000).

An article written by Peter Pronovost, Brad Weast, Mandalyn Schwarz, Rhonda Wyskiel, Donna Prow, Shelley Milanovich, Sean Berenholtz, Todd Dorman and Pamela Lipsett (2003) claims that one out of five injuries or deaths are associated with preventable adverse drug events (ADEs) (Pronovost et al., 2003). The article suggests that EMRs would prevent many ADEs, while providing automated medication reconciliation.

Adoption of an EMR system can do more than prevent medication errors; it also provides system flags about potential drug-drug interactions, patient conditions warranting medication dosing adjustments, physician alerts about drug effects, tests to run and symptoms to look for when administering certain drugs, and other decision support mechanisms. A study done by Nicholas Moore, Dominique Lecointre, Catherine Noblet and Michel Mabilie found that 77% of patients studied had adverse drug reactions “related to pharmacological properties of the involved drugs, and may possibly have been avoidable” (Moore et al., 1998, p. 301). AHRQ data show that incidence of ADEs varied from 2 to 7 per 100 admissions among hospitals that have conducted ADE studies (Reducing and Preventing Adverse Drug Events, 2001).

ADEs are not always predictable or preventable because they can include “accidents” such as unexpected reactions. What *can* be monitored easily is the process of drug administration, and the steps where information exchange can break down or be misinterpreted. The drug administration process comprises many steps, including medication ordering, transcription, distribution and then administering the drug. ADEs can

occur at any step in the process, which is why a computerized medication reconciliation system is necessary (Reducing and Preventing Adverse Drug Events, 2001).

In summary, the Centers for Medicare and Medicaid Services view electronic health records as “the inevitable next step in the continued progress of health care that can strengthen the relationship between patients and clinicians. The data, the timeliness and availability of it, will enable providers to make better decisions and provide better care” (Overview Electronic Health Records, 2010, p. 1).

CHAPTER 5: EMR SUCCESS STORIES IN HOSPITALS AND PHYSICIAN PRACTICES

Despite lingering ambiguities surrounding what constitutes “full EMR implementation” for both inpatient and outpatient facilities, we can look at several pre-HITECH implementations to glean best practices, lessons learned, and examples of cost savings. The following case studies show the benefits of EMRs and implementation strategies. It is difficult to determine actual return on investment figures, but the following implementation snapshots show direct and indirect benefits that were realized in a relatively short time.

Putnam General Hospital

Putnam General Hospital, a rural 25-bed facility in Eatonton, Georgia, was an unlikely candidate for aggressive EMR implementation. However, Putnam completed the process in 18 months. Putnam’s leadership was intentional about gaining buy-in and support for the initiative before they began the project, which made the mandatory employee training run smoother. Department heads, then clinicians were trained on all the software in weeklong classes with incentives like raffles. Doctors were trained one-on-one in their areas of use.

The most immediately visible improvements from the implementation were in capturing more charges and improving efficiencies (Healthland, Putnam, 2008). One director noted, “Each department is seeing different benefits. For example, emergency loves not having to go to medical records for patient information. This system makes it easy for everybody to track information, look through records, audit charts, find complaints and incidence reports, and more” (Healthland, Putnam, 2008, p. 3).

Putnam has integrated all financial and clinical modules, streamlined processes, facilitated staff access to information and better managed a variety of tasks. Their built-in safety checks decreased errors across all the departments. Today, approximately 90% of their records are electronic (Healthland, Putnam, 2008).

Glacial Ridge Hospital Systems (GRHS)

GRHS is a small hospital with three associated physician practices spread across rural Minnesota; making transfer of paper medical records a logistic nightmare. Another unlikely candidate for EMR implementation, GRHS began aggressively pursuing the idea of EMR technology in 2005 (Healthland, Glacial Ridge, 2008). In 2008, GRHS implemented a comprehensive EMR system, digitizing patient intake, clinical documentation, patient care guidelines, medication management, lab results review, medical messaging, patient care instructions and data retrieval. Future implementation plans include computerized physician order entry (Healthland, Glacial Ridge, 2008). This facility participated in training similar to Putnam's, but took it one step further, creating charts to explain how processes were previously done on paper and comparing them to how they'd be done on the EMR system.

A unique challenge for GRHS was that only one-quarter of their employees were computer literate (Healthland, Glacial Ridge, 2008). This required training on how to use a mouse and a keyboard before EMR technology training could occur. Vendor technical support supplemented GRHS' overtaxed IT department during training (Healthland, Glacial Ridge, 2008).

GRHS' former third-party vendor for scanning patient files was jettisoned in 2006 when GRHS brought scanning in house, utilizing their EMR technology to create fully

digital documents—which, in turn, reduced medical errors (Healthland, Glacial Ridge, 2008). An estimated \$10,000/month in lost charges was reconciled by instituting an EMR system in just one clinic. The Director of Nursing states, “The time we’re saving because of not having to search for patient charts is considerable. Our providers have immediate access to current patient information from any workstation. That in and of itself makes the transition to EMR invaluable” (Healthland, Glacial Ridge, 2008, p. 5).

Central Utah Multi-Specialty Clinic

Central Utah Multi-Specialty Clinic (CUMC) is Utah’s largest independent, multi-site, multi-specialty, physician group (Barlow, Johnson, & Steele, 2004). Delays in accessing patient charts, the high cost of transcription (\$1 million annually) and medical record management prompted CUMC’s shift to an EMR (Barlow, Johnson, & Steele, 2004). With 130,000 active patient charts, “ghost charts” was an issue with CUMC practitioners. The time lag involved in pulling, copying, transporting and sharing patient charts when a patient saw a physician at another office delayed delivery of the charts to another office when were needed. For many physicians and nurses, the “solution” was to create a new chart and operate from that temporarily. This led to incomplete records and multiple patient charts that needed to be merged. Transcription took up to three weeks to be typed, creating a lag in updating patient records (Barlow, Johnson & Steele, 2004). On top of everything, CUMC’s physician staff doubled near the decision time to move to an EMR system, bringing in thousands of new patients (Barlow, Johnson & Steele, 2004).

After selecting an EMR system, CUMC reaped many economic rewards: increased revenue of more than \$952,000 compared with the prior year, transcription costs reduced

by \$380,000 in just one year, and a projected \$8.2 million in savings over the next five years (Barlow, Johnson & Steele, 2004).

Additional Applications

An EMR's usefulness is not limited to community hospitals and physicians' offices. EMR implementation in those facilities is a prerequisite—and a foreshadowing—of what good could happen in the larger arena of public health: the health of an entire population. *Population health* encompasses the level and distribution of disease, functional status and well-being within a group. Population health monitoring is the collection and analysis of data to detect and describe changes in the population's health or factors that affect the population's health (Friedman, 2006, p. vii).

To accurately assess population health, massive amounts of data are required that truly reflect the population as a whole. The goal of analyzing such data is to intervene in areas of public health risk: to determine trends, disease prevalence and the factors behind them. Data analysis can uncover emerging trends, whether certain disease states could benefit from other interventions or earlier interventions, and pinpoint other areas of health concern.

Until now, health care facilities would submit public health information piecemeal in various formats and from various departments as required by state or federal entities. The pending widespread implementation of EMRs offers a way to obtain interoperable, complete data collection for public health purposes. Such data can enable the government to determine how to most effectively allocate their resources. For example, instituting a new or more effective health education program can positively affect the health of an entire population. Theoretically, this “indirect care” should decrease health care costs, thus, ultimately saving insurers, health care providers and consumers money.

The ability to detect and describe changes in population health is the focus and future of the public health sector. In fairness, health care is not the only influence on population health, and EMR systems are not a perfect solution because the “multitude and variety of influences on population health” may not be fully represented by data collected in health care settings. Data collection from non-clinical sources is needed as well (Friedman, 2006).

While EMR systems are not a cure-all for population health analysis, they provide a clear increase in data availability and accessibility. After the needed information becomes readily available, the scope of population health analysis can broaden significantly.

A report issued by the Centers for Disease Control and Prevention, National Center for Health Statistics report (2006), states, “it is still too early to ascertain the actual potential of national strategies for electronic health records for population health monitoring and research” (Friedman, 2006, p. x). What we do know is that public health reporting needs a large sample size and a variety of information—and widespread realization of EMR systems offers a potential solution to mining such data. Today’s limited examples of how EMR systems can benefit the public health sector give us a glimpse of the potential and promise of EMR systems as they relate to public health monitoring.

AHRQ Demonstration Projects

While the up-front costs and logistics of implementing EMR systems in physicians’ offices and hospitals can be daunting, the startup costs and logistics to create statewide health information exchanges (HIEs) are impossible without infusions of federal funding. AHRQ did this in 2004 by launching six demonstration projects to help develop statewide and regional HIEs in Colorado, Delaware, Rhode Island, Indiana, Utah and in the mid-south region (centered in Tennessee). These five-year projects each received \$5 million “to

demonstrate the provider-, organization-, and community-level effects of HIE on patient safety and quality of care” (AHRQ Publication No. 10-0075-EF, p. 1-1). The results, published in May 2010, describe lessons learned in a pre-HITECH environment.

The Indiana Health Information Exchange (IHIE) was one of AHRQ’s five-year demonstration projects. Although it already had a network of “39 hospitals, 10,000 physicians and more than six million patients” for securely delivering lab results, reports, medication histories, and treatment histories (Indiana Health Information Exchange, 2010), IHIE wanted to replace all mandatory public health reporting with electronic extraction and reporting of data, “creating a person-centric data system for public health through driving all data into one location” (Indiana Health Information Exchange, 2010). AHRQ funding of IHIE’s efforts expanded its pre-existing electronic data collection and reporting so that it could track additional data, including hospital emergency room visits and ambulatory care visits (Banger, et al., 2010, p. 2-2).

Kaiser Permanente

Kaiser Permanente, an integrated regional managed care organization, has a long history of using its electronic data for patient care as well as for population-based research (Friedman, 2006). Kaiser’s full implementation of its integrated disease registry (KP HealthConnect) in both inpatient and outpatient settings is helping caregivers better deliver care for chronic conditions and is providing researchers with data to help determine more effective care strategies. In addition, Kaiser is working with the U.S. Department of Veterans Affairs to “determine ways to securely share patient information from KP HealthConnect through the National Health Information Network when patients are under the care of multiple health systems” (Kahn, 2010, p. 1).

Indian Health Services

An example of using electronic reporting for interstate public health monitoring is the Indian Health Service (IHS). AHRQ has invested in assisting IHS health care systems to improve and expand their existing “point of care” electronic health records on the United States’ Native Indian population (Collaborations & Activities, AHRQ website). IHS is also partnering with the VHA to improve the system’s functionality, disease management clinical guidelines and case management system (Collaborations & Activities, AHRQ website).

This collaboration is important to the EMR discussion because it is automating health records that have already been analyzed—records that have already yielded certain trends for the American Indian population (including diabetes, mellitus, alcohol use, tuberculosis status and tobacco use)—and expanding them to include other factors unique to that population, including “intimate partner violence/ domestic violence screening, suicide surveillance, and other issues” (Friedman, 2006, p. 50). These additions of “non-clinical” data provide a more complete picture of the population, which can ultimately lead to services that improve both the population’s health and quality of life (Friedman, 2006).

The potential benefits for this type of work are almost unlimited. For example, a 2006 CDC Report notes a database like this could be used for cancer registries and syndromic surveillance, including early detection of “possible biologic terrorism attacks and other events of public health concern on a national level” (Friedman, 2006, p. 49).

Veterans Health Administration: national EMR network

The current model that most tantalizingly hints at the full potential for EMR system implementation is found in the Veterans Health Administration (VHA). The VHA utilizes

Veterans health information systems technology Architecture (VistA) and computerized patient record system (CPRS) in both VHA inpatient and outpatient sites (Friedman, 2006). VistA and CPRS are brilliant examples of EMR capabilities nationally in the public health arena. For example, in 1999, VHA electronic epidemiological data monitoring helped uncover the fact that otherwise-healthy U.S. veterans of the Gulf War had developed ALS (Lou Gehrig's disease) at a rate approximately three times that of the general population (Haley, 2003, p. 751). VHA's technology is strategically designed for such population health monitoring and research (Friedman, 2006).

Beyond the implications for public health, the VHA has also made VistA-Office EPR available "through the Centers for Medicare and Medicaid Services to physicians within the Doctor's Office Quality-Information Technology program, and VistA has been adapted by the IHS" (Friedman, 2006, p. 51). This is significant because VHA has found a way to share EMRs outside of the VHA with other physicians. VHA has even made VistA an "open source" system, "available to the public at no charge—thereby lessening providers' cost of adopting health IT" (Congressional Budget Office, 2008, p. 23). VHA is an example of cutting-edge health information technology, and it is well on the way to the future of it!

CHAPTER 6: GOVERNMENT'S ROLE IN EMR IMPLEMENTATION

Health information technology (HIT) has the ability to lessen or avert problems in the health care arena. However, it is an expensive, time-intensive proposition that requires government assistance with startup costs and oversight, as well as a plan for sustainability. Champions of this technological movement should include providers, insurance companies and political figures. The federal government is an advocate for HIT, as are a variety of organizations within the U.S. Department of Health and Human Services (USDHHS). An important and prominent champion of EMR systems within USDHHS is the AHRQ. In 2008 alone (latest available statistics), AHRQ funded 329 projects related to EMR systems implementation and to health information exchanges (AHRQ-Funded Projects, 2008).

Among AHRQ's funding efforts, the most notable is its groundbreaking study on demonstration projects (SRDs) of state and regional health information exchanges (HIE). Each project began in 2004 or 2005, ended in 2009 or 2010 and involved an investment of \$5 million per project. Each entity had autonomy in setting up its technical, business and governance models for its respective health information exchange. The goal was to determine best practices for future applications (Banger, et al., 2010).

In May 2010, AHRQ reported its results, saying, "establishing electronic health information exchange is highly complex because it demands advancement in multiple challenging areas in a synchronized manner" (Banger, et al., 2010, 4-1). Beyond noting the system's technical complexities, AHRQ enumerated lessons learned, which are summarized as follows (Banger, et al., 2010, 4-1):

- Engage a diverse group of stakeholders and build community consensus.
- Establish a board of directors and advisory committees and volunteer groups.

- Create a blueprint for long-term sustainability, while keeping participation costs low. (*Note:* Grant funding is considered only a short-term option.)
- Match your needs with the right technical infrastructure; then use it early and often to demonstrate the value of the HIE system. Adopt scalable technology.
- Know the legal obligations that the system must meet (HIPAA, state/federal laws).
- Recruit a large user base to achieve the “critical mass” needed to have enough data to demonstrate the system’s potential.
- Realize that the system may not pay for itself for the first few years.

These lessons learned (Banger, et al., 2010, 3-1-14) are crucial to the implementation of more HIEs and have particular implications for government involvement.

Public administration needs to be intimately involved in EMR systems adoption and HIE implementation—an enterprise so complex and costly that it cannot happen without government assistance. But it is a necessary next step in developing statewide HIEs.

Notably, the \$5 million granted to each demonstration project was not enough to cover startup and ongoing costs for five years. A necessary contingency of the awards was for each site to develop a detailed business plan that included other means of financing HIE implementation, upgrades, and sustainability (Banger, et al., 2010).

Thus, it is unrealistic to expect that any single entity (federal or state government, HIE participants, etc.) is capable of sustaining HIEs; therefore, the government needs to help promote the benefits of HIEs so that participation is great enough to enable economic sustainability (Banger, et al., 2010, p. 3-11). The bottom-line, tangible financial return on investment for many of these projects may be years down the road. However, a less tangible ROI is increased benefits to population monitoring and public health.

The government can and should be involved in EMR and HIE implementation in ways other than financially. The Congressional Budget Office (CBO) released a paper on the costs and benefits of HIT (2008), stating, “The federal government can influence the development and growth of health information technology (health IT) through its operation and management of federal programs that finance health care” (Congressional Budget Office, 2008, p. 22). In particular, Medicare and Medicaid are mentioned, which constitute 20 percent and eight percent of all reimbursements for health care services, respectively (Congressional Budget Office, 2008, p. 22). Both programs are leveraging EMR usage as a tie-in to performance-based reimbursements (pay-for-performance/ P4P).

Friedman (2006) wrote that “national leadership is critical” in regard to “EMR systems and their successful implementation” (Friedman, 2006, p. 44). The government can influence HIE implementation in several ways. It can either subsidize or require it; it can offer bonuses, grants or incentives, such as the regulation and incentives stated in HITECH.

The 2010 AHRQ report suggested to “minimize the burden on data providers, as they found that those who hold data are more willing to share information if they are not required to process it before submitting it” (Banger, et al., 2010, p. 3-10). The report suggests that the government has the ability to change the reporting process, which includes not only the format for data transmission, but also the type of reporting involved (such as state- and federally-mandated epidemiology reporting). If the government can make the reporting process easier in utilizing an EMR system, more participants might see the value in HIEs and jump on board (Banger, et al., 2010, p. 3-10). Similarly, the government can simplify the 110 “meaningful use” rules that physicians’ offices must comply with (SearchHealthIT.com, 2010).

In addition to interventions already mentioned, the federal government has the ability and obligation to spread the word about EMR and HIE technologies and their benefits. Friedman (2006) stated that a large constraint in EMR implementation is “lack of awareness of the potential of electronic health records for population health monitoring and research” (Friedman, 2006, p. 47). One rubber-meets-the-road example is the “Health IT Tools” website that AHRQ has developed. Included in the toolkit is a downloadable handbook of practical assistance regarding how to plan for, evaluate and implement an EMR system (www.ahrq.gov).

The more advocates that HIEs gain, the better the chances of their widespread implementation. HIE support is well on its way with federal buy-in. CBO’s 2008 report states, “more than 20 federal agencies have agreed to endorse standards that enable information to be shared among agencies and that can serve as a model for the private sector” (Congressional Budget Office, 2008, p. 23). ONCHIT is currently developing standards for interoperability (Congressional Budget Office, 2008, p. 25).

The involvement of public administration in the HIE process is just as important as the network’s technological capabilities; both have the potential to substantially build the HIE community. Ultimately, this would affect public and population health.

Suggestions for Further Involvement

A report prepared for AHRQ strongly recommends that “vendors establish and document their programs for testing the usability of their systems (people and processes), including evaluating potential impacts on quality and safety” (Armijo, et al., 2009, p. 14-15). This has potential to evolve into federal standards regarding quality and safety. The only body that could mandate such guidelines would be the government. Another

suggestion is to develop a national EHR usability laboratory to: 1) support public-private collaboration and sharing of best practices in this area, 2) develop tools and processes to support evaluation of products and implementations, 3) assist health IT vendors in product development and health care organizations in effective implementation of EHRs (Armijo, et al., 2009, p. 14-15).

A national laboratory would offer provider support needed during EMR implementation. The laboratory could also serve as a hub for evaluation and continuing process improvement. Government participation in, and support of these measures could directly affect hospital and physician office EMR implementation in very practical ways.

Valuable non-clinical ways in which government involvement could promote and further EMR implementation would be to use the systems with adoption, foster care, and state mental health records—similar to what Indian Health Services is doing by tracking the incidence of alcoholism, abuse, and other socioeconomic data. This can give a more comprehensive picture of factors impacting health. I believe that if the government encouraged EMR use with these facilities, allowing them to be interoperable with health care facilities, it would offer three advantages: 1) more accurate and complete records that 2) are easier to access and 3) provide a broader picture of health to practitioners.

Finally, HIMSS' ultimate goal is a national health information network. The dominoes effect of building HIEs from EMRs and building a national network from HIEs underscores the possibilities of scrutinizing data regionally and nationally for population health analysis (Healthcare Information and Management Systems Society, 2007).

CHAPTER 7: CONCLUSION

A widely shared problem in all industries is the battle between efficiency and effectiveness. The federal government is particularly interested in saving money and promoting wise utilization of health care resources. Public health has the challenge of protecting and promoting population health while coping with limited funds and many needs. EMRs offer a way to deliver cost savings and better health care to individuals and to public health.

Because the goal of using EMRs is to improve the quality of care, reduce costs, and increase efficiencies (SearchHealthIT.com, 2010), EMRs are fiscally responsible choices that also can transform population health as a whole. Electronic medical record systems promise to fill an industry need for improving medical records while protecting and promoting the welfare of citizens through population monitoring (Overview Electronic Health Records, 2010).

What gets measured, gets done; and the government has taken a giant step in this direction by establishing “meaningful use” benchmarks for successful HIT utilization. But the studies cited in this research paper underscore governmental involvement beyond HITECH and ARRA. The federal government cannot simply legislate programs. It needs to help statewide networks gain stakeholder buy-in. The federal government also can and needs to standardize measurements related to EMRs. “Meaningful use” guidelines are just the beginning of such standardization.

The federal government has the responsibility and obligation to respond to the needs of its citizens while protecting their best interests. While it is not feasible for tax money to completely pay for implementation, true progress on EMR systems adoption requires

stakeholders to unite “government, provider, and payer support for the nationwide rollout of electronic records” (Halamka, 2006, p. 3).

The task of instituting statewide networks is not without challenges:

The goal of assuring an electronic health record for every American is daunting.

We at the Office of the National Coordinator for Health Information Technology

do not pretend otherwise. We know this will be hard for some clinicians and

hospitals, and we stand ready to help with resources provided by the Congress and

the Administration (Blumenthal, 2009).

Research supports that the institution of health information exchanges, prompted by electronic medical record systems development, is in the best interest of our country—and our citizens. With regulation and agency support, federal involvement in EMRs is a giant step in the right direction. What greater cause does the government have than to be a wise steward of our nation’s resources? Citizens count on their government to protect their interests. Taking action now, during the early stages of EMR/HIE development, will provide necessary assistance to a project on the cusp of health care innovation.

REFERENCES

- AHRQ health information technology news. (2009, September 4). *Patient Safety and Health Information Technology E-newsletter*, 55. Rockville, MD: Agency for Health care Research and Quality. Retrieved July 7, 2010 from <http://www.ahrq.gov/news/ptsnews/ptsnews55.htm#1>
- AHRQ web site. AHRQ-Funded Projects. 2008. Retrieved August 18, 2010, from http://healthit.ahrq.gov/portal/server.pt/community/ahrq-funded_projects/654
- American Hospital Association. (2005). *Forward momentum: Hospital use of information technology*.
- Armijo, D., McDonnell, C., & Werner, K. (2009). *Electronic health record usability: Interface design considerations* (AHRQ Publication No. 10-0091-2-EF). Rockville, MD: Agency for Health care Research and Quality.
- Banger, A.K., Dullabh, P., Eichner, J., & Kissam, S. (2010). *Lessons learned from AHRQ's state and regional demonstrations in health information technology* (AHRQ Publication No. 10-0075-EF). Rockville, MD: Agency for Health care Research and Quality.
- Barlow, S., Johnson, J., & Steck, J. (2004). The economic effect of implementing an EMR in an outpatient clinical setting. *Journal of Health care Information Management*, 18(1).
- Blumenthal, DJ. (2009, August 19). Dr. Blumenthal Update 1. Health information technology for the future of health and care. Retrieved from http://healthit.hhs.gov/portal/server.pt?open=512&objID=1327&parentname=CommunityPage&parentid=4&mode=2&in_hi_userid=11113&cached=true

- Caroompas, J. (2009, April 15). News center: News and perspectives from Kaiser Permanente. *Kaiser Permanente*. Retrieved June 11, 2010, from <http://xnet.kp.org/newscenter/pressreleases/ncal/2009/041509portableemr.html>
- Centers for Medicare & Medicaid Services. Medicare and Medicaid Programs; Electronic Health Record Incentive Program; Final Rule (2010). *Federal Register*, 75(144), 44314.
- Christian, L. (2010, July 12). Clarian home care meets needs across the state. *The Clarian*.
- CMS Official Web Site for the Medicare and Medicaid EHR Incentive Programs. Information related to the economic recovery act of 2009. (2010, May 13). *Centers for Medicare & Medicaid Services*. Retrieved June 11, 2010, from http://www.cms.gov/Recovery/11_HealthIT.asp
- Collaborations & Activities.(n.d.). *Agency for Health care Research and Quality*. Retrieved August 18, 2010 from http://healthit.ahrq.gov/portal/server.pt/community/ahrq-funded_projects/654/collaborations_activities/5539
- Congressional Budget Office. (2008, May). *Evidence on the costs and benefits of health information technology*. Publication No. 2976
- Definitions. (n.d.). *HIPAA Survival Guide*. Retrieved July 5, 2010, from <http://www.hipaasurvivalguide.com/hitech-act-13101.php>
- DesRoches, C., Campbell, E., Vogeli, C., Zheng, J., Rao, S., & Shields, A. (2010). Electronic health records' limited successes suggest more targeted uses. *Health Affairs*, 29(4), 639-646.
- Dobbyn, T., Heavey, S., & Wutkowski, K. (2009, December 31). U.S. issues standards to spur e-health records. *Reuters*. Retrieved July 7, 2010 from <http://www.reuters.com/article/idUSTRE5BT4CF20091231>

EHR adoption. (2010, January 13). *Health care Information and Management Systems Society*.

Retrieved June 11, 2010, from

http://www.himss.org/ASP/topics_FocusDynamic.asp?faid=198

Electronic medical record-facilitated care process redesign enhances access to care, reduces

hospitalizations and costs for patients with chronic illnesses. (n.d.). *Agency for Health care*

Research and Quality. Retrieved July 7, 2010 from

<http://www.innovations.ahrq.gov/content.aspx?id=1725>

Electronic medical records. (2005, October 12). *OpenClinical*. Retrieved July 7, 2010, from

www.openclinical.org/emr.html

FOXNews, The Associated Press. Obama warns health care costs pose 'biggest threat' to

economy. (2009, March 5). *FOXNews.com*. Retrieved June 11, 2010, from

[http://www.foxnews.com/politics/2009/03/05/summit-obama-warns-health-care-costs-
pose-biggest-threat-economy](http://www.foxnews.com/politics/2009/03/05/summit-obama-warns-health-care-costs-
pose-biggest-threat-economy)

Friedman, D. J. (2006). Assessing the potential of national strategies for electronic health

records for population health monitoring and research. National Center for Health

Statistics. *Vital Health Statistics*, 2(143).

Fratt, L. (2009, September 23). Achieving data integration: Taming the interoperability beast

(without breaking the bank). *CMIO*. Retrieved August 19, 2010, from

[http://www.cmio.net/index.php?option=com_articles&view=article&id=18843:achieving-
data-integration-taming-the-interoperability-beast-without-breaking-the-bank](http://www.cmio.net/index.php?option=com_articles&view=article&id=18843:achieving-
data-integration-taming-the-interoperability-beast-without-breaking-the-bank)

Garets, D. & Davis, M. (2006, January 26). Electronic medical records vs. electronic health

records: Yes, there is a difference. *HIMSS Analytics*.

- Geographic mobility/migration. (2009, September 16). *Census Bureau Home Page*. Retrieved June 17, 2010, from <http://www.census.gov/population/www/socdemo/migrate/cal-mig-exp.html>
- Halamka, J. (2006). The perfect storm for electronic health records. *Journal of Health care Information Management*, 20(3), 25-27.
- Haley, R. (2003). Excess incidence of ALS in young gulf war veterans. *Neurology*, 61, 750-756.
- Healthcare Information and Management Systems Society. (2007). *EHR implementation in ambulatory care: A white paper by the HIMSS ambulatory paperless clinics work group*. Retrieved June 26, 2010, from http://www.himss.org/content/files/Amb_EHR_Implementation081507.pdf
- Health care Information and Management Systems Society. (n.d.). *Health care information exchange*. Retrieved August 16, 2010, from www.himss.org/asp/topics_hie.asp
- Health care Information and Management Systems Society. (n.d.). *Integration vs. Interoperability*. Retrieved August 13, 2010, from www.himss.org/asp/topics_hie.asp
- Healthland. (n.d.). *Glacial ridge health system now at the forefront of electronic medical record: Success story*. Retrieved July 10, 2010, from http://www.himsssehra.org/docs/caseStudies/Healthland_Glacial_Ridge_SucceSu_Story.pdf
- Healthland. (n.d.). *Putnam General Hospital: Success story*. Retrieved July 10, 2010, from http://www.himsssehra.org/docs/caseStudies/Healthland_Putnam_General_Success_Story.pdf

- Hillestad, R., Bigelow, J., Bower, A., Girosi, F., Meili, R., & Scoville, R. (2005). Can electronic medical record systems transform health care? Potential health benefits, savings, and costs. *Health Affairs (Project Hope)*, 24(5), 1103-1117. Retrieved from MEDLINE database.
- HIMSSAnalytics. *U.S. EMR Adoption Model Trends*. 2009. Retrieved August 18, 2010, from <http://www.himssanalytics.org/>
- Leyva, C., Leyva, D. *HITECH Survival Guide (2009-2010)*. Amendments to Sec. 13101: ONCHIT; Standards Development and Adoption. Retrieved July 7, 2010, from <http://www.hipaasurvivalguide.com/hitech-act-13101.php>
- Hunkar, D. (2010, July 5). Comparing U.S. health care spending with other OECD countries -- seeking alpha. *Stock Market News, Opinion & Analysis, Investing Ideas -- Seeking Alpha*. Retrieved July 15, 2010, from <http://seekingalpha.com/article/146992-comparing-u-s-health-care-spending-with-other-oecd-countries>
- Indiana Health Information Exchange | BioCrossroads. (n.d.). *BioCrossroads*. Retrieved June 11, 2010, from <http://www.biocrossroads.com/content.aspx?Key=13>
- Jha, A.K., DesRoches, C.M., Campbell, E.G., Donelan, K., Rao, S.R., Ferris, T.G., ...Blumenthal, D. (2009). Use of electronic health records in U.S. hospitals. *The New England Journal of Medicine*, 360, 1628-1638. Retrieved July 8, 2010, from www.nejm.org
- Litwin, A. S. (2008). *Information technology and the employment relationship: An examination of the adoption and use of electronic health records* (Doctoral dissertation, Massachusetts Institute of Technology, 2008). Retrieved April 27, 2010, from <http://mit.dspace.org/bitstream/handle/1721.1/45152/315870120.pdf?sequence=1>

- Litwin, A. S. (2009, May 11). *Why don't docs digitize? The adoption of health information technology in primary care medicine*. Retrieved August 16, 2010, from <http://ssrn.com/abstract=1431202>
- Kahn, R. (2010, March 3). *Kaiser Permanente completes electronic health record implementation*. Retrieved August 16, 2010, from <http://xnet.kp.org/newscenter/pressreleases/nat/2010/030310ehrcomplete.html>
- McDonald, C. J. (1997). The barriers to electronic medical record systems and how to overcome them. *Journal of the American Medical Informatics Association*, 4(3), 213-221. Retrieved June 19, 2010, from the PubMed Central database.
- Miller, K. (2010, April 5). Health care groups collaborate on new reference guides for personal health records. *BCBSA News*, 1. Retrieved June 17, 2010, from [http://www.bcbs.com/news/bcbsa/health care-groups collaborate.html](http://www.bcbs.com/news/bcbsa/health-care-groups-collaborate.html)
- Mitre Corporation. (2006). *Electronic health records overview*. McLean, VA: National Institutes of Health National Center for Research Resources.
- Moore, N., Lecointre, D., Noblet, C., & Mabile, M. (1998). Frequency and cost of serious adverse drug reactions in a department of general medicine. *BJCP*, 45(3), 301-308. Retrieved March 11, 2010, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1873369/>
- Nichols, B. (n.d.). Federal deficit hits all-time December high – Bill Nichols - POLITICO.com. *Politics, Political News - POLITICO.com*. Retrieved April 11, 2010, from <http://www.politico.com/news/stories/0110/31479.html>

- Overview electronic health records. (2010, January 13). *Centers for Medicare & Medicaid Services*. Retrieved June 11, 2010, from <http://www.cms.gov/EhealthRecords>
- Patient safety and health information technology e-newsletter. (2009, September 4). *Agency for Health care Research and Quality (AHRQ) Home*, 55. Retrieved April 12, 2010, from <http://www.ahrq.gov/news/ptsnews/ptsnews55.htm#1>
- Paul, C. (2000). Reducing medical errors and improving patient safety: Success stories from the front lines of medicine. *Accelerating Change Today (A.C.T.) for America's Health*, 1(1), 4-8. Retrieved March 31, 2010, from http://www.ihl.org/ihl/uploads/medical_errorsACT.pdf
- Pinkerton, K. (2006, July 27). History of electronic medical records. *Ezine @rticles*. Retrieved August 18, 2010, from <http://ezinearticles.com/?History-Of-Electronic-Medical-Records&id=254240>
- Pronovost, P., Weast, B., Schwarz, M., Wyskiel, R., Prow, D., & Milanovich, S. (2003). Medication reconciliation: a practical tool to reduce the risk of medication errors. *Journal of Critical Care*, 18(4), 201-205.
- Reducing and preventing adverse drug events to decrease hospital costs*. (2001, March). (AHRQ Publication No. 01-0020). Rockville, MD: Agency for Health care Research and Quality. Retrieved March 31, 2010, from <http://www.ahrq.gov/qual/aderia/aderia.htm>
- Schachter, J. P., Franklin, R. S., & Perry, M. J. (2003, August). Migration and geographic mobility in metropolitan and nonmetropolitan America: 1995 to 2000. *Census 2000 Special Reports*, 1-8. Retrieved June 17, 2010, from <http://www.census.gov/prod/2003pubs/censr-9.pdf>

SearchHealthIT.com. (2010, February 4). FAQ: How does meaningful use affect health care IT? Retrieved August 20, 2010, from <http://searchhealthit.techtarget.com/tutorial/FAQ-How-does-meaningful-use-affect-health-care-IT>

State and regional demonstrations projects decrease hospital costs. (2001, March). Rockville, MD: Agency for Health care Research and Quality. Retrieved August 21, 2010, from http://healthit.ahrq.gov/portal/server.pt/community/ahrq-funded_projects/654/state_and_regional_demonstration_projects/12043

Taylor, M. (2010, June 8). Records go electronic: Med systems converting. *Post-Tribune of Northwest Indiana*. Retrieved July 7, 2010, from <http://www.post-trib.com/news/2364988,new-medrecords0608.article>

Vanac, M. (2010, April 26). Electronic medical records powered by billions in stimulus dollars. *Medcity News*. Retrieved July 7, 2010, from <http://www.medcitynews.com/2010/04/billions-of-stimulus-dollars-flow-for-electronic-medical-records>

APPENDICES

APPENDIX I

Abbreviations

ADE: adverse drug event

AHIMA: American Health Information Management Association

ALS: amyotrophic lateral sclerosis

AMA: American Medical Association

ARRA: American Recovery and Reinvestment Act (of 2009)

CBO: Congressional Budget Office

CDC: Centers for Disease Control and Prevention

CMS: Centers for Medicare and Medicaid Services

EHR: electronic health record

EMR: electronic medical record

HIE: health information exchange

HIMSS: Health Information Management and Systems Society

HIPAA: Health Insurance Portability and Accountability Act

HIT: health information technology

HITECH: Health Information Technology for Economic and Clinical Health Act

IT: information technology

ONCHIT: Office of the National Coordinator for Health Information Technology

USDHHS: United States Department of Health and Human Services

APPENDIX II

Key Concepts and Definitions

The American Health Information Management Association (AHIMA) defines three essential capabilities for an electronic medical record (EMR) system. It must: 1) capture data at the point of care, 2) integrate data from multiple internal and external sources, and 3) support caregiver decision-making (Electronic Medical Records, 2005). These three umbrellas encompass varied aspects of individual EMRs, including patient health information, order management, decision support, report management, connectivity and patient support (Electronic Medical Records, 2005).

An electronic medical record does not operate in a vacuum; it is supported by robust infrastructure. The main components that are relevant to this research paper are defined on the following pages. All definitions reflect AHIMA, HIPAA, CMS, HIMSS, and ONCHIT (Office of the National Coordinator for Health Information Technology) standards.

An *Electronic Medical Record (EMR)* is a legal document that contains all the history of care given by any care provider in a hospital or outpatient setting: all evaluations, monitoring, clinical data, testing, clinical decisions made, and care given. Because the health care provider “authors” the EMR, that organization owns the EMR (Electronic Medical Records, 2005).

An *Electronic Health Record (EHR)* is a select subset of an EMR. For the purpose of this research paper and the references used in it, this term is interchangeable with electronic medical record (EMR). (Electronic Medical Records, 2005; Garets & Davis, 2006).

A *Personal Health Record* according to www.ahima.org is information that the patient collects and records about him/herself. This record can be digital, on paper, or a

combination of both. The patient owns this information and can add to it at any time. Some people (such as Donna Brown, mentioned previously) voluntarily keep a PHR. Insurance companies are pushing greater use of digitized personal health records as a way to help monitor and manage people with chronic conditions so they can stay as healthy as possible. In that respect, the PHR also serves as a type of portal for the patient to receive helpful information and reminders.

Certified EHR technology is a “qualified” electronic health record that meets federal standards that apply to the type of record involved (e.g., inpatient hospital record versus doctor’s office record). These standards pertain to what kind of information is included in the electronic record, as well as how it is handled, and whether it is in accordance with all the certification criteria set forth by ONCHIT (HITECH Survival Guide, 2010).

A health care provider includes a hospital, skilled nursing facility, nursing facility, long-term care facility, health care clinic, community mental health center, renal dialysis facility, blood center, ambulatory surgery center, emergency medical services provider, group practice, physician, pharmacist, pharmacy, laboratory, certain other practitioners and therapists (e.g., physician assistants, physical therapists), a provider for the Indian Health Service/tribal organization/urban Indian organization, and other qualified health centers or practitioners as defined by the government (HITECH Survival Guide, 2010).

Health information technology is collectively the hardware, software, integrated technologies, related licenses, intellectual property, upgrades, or packaged solutions sold as services to support health care entities (or patients, in the case of PHRs) in creating, maintaining, accessing, and exchanging health information (HITECH Survival Guide, 2010).

A Health information exchange (HIE) is an organization that utilizes health information technology to improve the quality, safety and efficiency of health care delivery over a local, state or regional network. “Health care Information Exchange initiatives focus on the areas of technology, interoperability, standards utilization, harmonization, and business information systems while also supporting HIMSS activities” (Health care Information and Management Systems Society, 2007).

Integration is the way an organization’s information system is ordered so that all of an EMR’s components, regardless of its point of origin within the organization (lab, pharmacy, nursing unit, etc.), is brought together in a single system that all authorized users in all areas can readily access and use (Health care Information and Management Systems Society, 2010).

Interoperability is the ability of health information systems to work together across organizational boundaries, such as between hospitals or physician practices within the same state (Health care Information and Management Systems Society, 2010).

Meaningful use is an attempt to quantify both the capabilities of a provider’s EMR system as well as to what extent it is being used. This has two purposes: to promote adoption of EMR systems and to promote the incentives currently available for doing so. If physicians are not using EMRs in a meaningful way in their practice by 2015, they will face annual reductions in Medicare reimbursements, up to a maximum penalty by the year 2020 (SearchHealthIT.com, 2010).

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