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# Show Providers the Money: Revenue Cycle Improvement, the Bargaining Chip Needed for Widespread EMR Adoption

*WORKING PAPER SERIES*

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# Introduction

Electronic medical records (EMRs) have taken center stage in the national healthcare reform debate that seeks to extend coverage to 47 million Americans and reduce the 9.8 percent annual growth in US healthcare spending over the last 35 years (Kaiser Family Foundation). Although EMRs are frequently misinterpreted by politicians and major media outlets alike, their quick and effective adoption by healthcare providers remains uncertain. The New England Journal of Medicine found that merely 1.5 percent of nonfederal hospitals report having a comprehensive EMR system while only 7.6 percent report having a basic system in place (Jha, DesRoches and Campbell). In a related study, the same research team found similarly low EMR adoption rates among physician practices; merely four percent of practices report having a comprehensive EMR system, while only 13 percent report having a basic system (DesRoches, Campbell and Rao). Facilitating widespread adoption will likely take more than just White House summits and the 2009 Economic Stimulus incentives.

Even if EMR adoption were to occur, the potential quality and cost impact of adoption is uncertain and varies across studies. The oft quoted 2005 RAND Corporation analysis, "Extrapolating Evidence of Health Information Technology Savings and Costs," sets potential savings as high as $80 billion, with a mean annual savings of about $40 billion (Girosi, Meili and Scoville)[1]. The $80 billion annual savings expectation is also supported by the Center for Information Technology Leadership which identified $77.8 billion in potential savings compared to current practices (Center for Information Technology Leadership). In response to both studies, the Congressional Budget Office (CBO) has expressed concern that underlying assumptions are overly optimistic. On March 10, 2009, before the House Subcommittee on Health, CBO director Douglas Elmendorf testified that a total of only $13 billion would be saved through EMR adoption between 2009 and 2019 (Elmendorf).

[1] Projections based in 2005 dollars

While the likelihood of adoption and the cost savings of EMRs remain uncertain, what is certain is that the Obama Administration and the Democratically controlled Congress are committed to EMRs playing a central role in overall healthcare reform. The 2009 Congressional Stimulus Package allocated $32 billion toward "the development of nationwide health information technology (HIT) infrastructure that allows for the electronic use and exchange of information (111th Congress, 2009)[2]." This funding will be available beginning 2011 and will last for 5 years with a decreasing payment schedule each year until 2016. To further encourage EMR adoption, Congress authorized the Center for Medicare and Medicaid Services (CMS) to begin reducing provider reimbursement by 1 to 3 percent each year for "non-meaningful EMR users" beginning in 2015. One week after signing the stimulus package, in his first address to a joint session of Congress, President Obama reiterated his administration's commitment to electronic medical records: "Our recovery plan will invest in electronic health records and new technology that will reduce errors, bring down costs, ensure privacy, and save lives (Obama)." Given the commitment demonstrated by Congress and President Obama, the national debate is no longer *if* EMR should be adopted, but *how* the United States can best promote EMRs and the exchange of health information.

The coordinated Congressional and executive agency effort to spur an IT revolution in the US healthcare marketplace is set to battle an industry accustomed to the status quo and skeptical of change. Efforts to introduce information technology are not new, enforcement deadlines are rarely steadfast, and provider resistance is difficult to overcome.

Conferences on "medical electronics" first appeared in the 1960s and yet over the last 40 plus years almost every major effort to redesign the delivery process to incorporate IT has failed. In the 1980s and early 1990s, physicians remained mostly unaware of the internet and the only hospitals with internet connections were found on college campuses (Shortliffe). Remarkably, until President George

[2] The expected $13 billion in public savings offsets the $32 billion allocation for a net budget impact of $19 billion

W. Bush established a national coordinator's office in 2004, there was no strategic cross agency IT leadership at the Department of Health and Human Services. Instead, each sub-agency dealt with IT issues within its own boundaries. In 2000, the National Research Council released a call to arms for a HIT revolution: "The Internet has enormous potential to transform healthcare through information technology applications in such areas as consumer health, clinical care, administrative and financial transactions, public health, professional education, and biomedical and health services research (Institute of Medicine)." Unfortunately, the revolution has yet to come and the statement remains as pressing as it did in 2000. The historical resistance to IT is even acknowledged at Google, arguably the nation's most brash and innovative technology firm. In an April 2009 interview with *The Economist*, the head of Google's EMR division responded to a question on the slow rate of technology progress in the industry by saying simply, "Health is hard. (The Economist)"

Historically, EMR adoption has been made difficult because providers rarely expect steadfast enforcement of regulatory deadlines. Deadline extensions for HIPAA compliance and ICD-10 reporting do not lend credibility to the threat of Medicare reimbursement reductions in 2016, as stipulated in the 2009 stimulus bill[3]. HIPAA and ICD-10 are especially relevant given the integral role both will play in the exchange of health information. Enacted by Congress in 1996, the second title of HIPAA sought to provide national standards for electronic healthcare transactions and national identifiers for providers, payers, and employers with an emphasis on privacy protection. Outlined in 1996, HIPPA's security and privacy rules were not finalized until 2003 (Fitzgerald). The process of defining meaningful use for EMRs, which is the basis for reimbursement reductions, will likely face the same hurdles as finalizing the rules for HIPAA.

In August 2008, the Department of Health and Human Services set an October 2011 deadline for the adoption of ICD-10 code sets. ICD-10 would update the 30 year-old standards used to classify diseases,

[3] See Appendix A for full HIPAA and ICD-10 definitions

symptoms, abnormal findings, complaints, and causes of disease or injury. The ICD code sets are central to calculating morbidity and mortality statistics, processing reimbursement claims, and developing automated decision support in medicine. Version 10 of the ICD, which was completed in 1992, would be especially helpful to aggregating public health data under interoperable EMR use. The power of providers is evident in that after receiving more than 3,000 complaints against the October 2011 deadline for ICD-10, the Department of Health and Human Services postponed adoption enforcement until October 2013 (iHealth Beat).

The track record of limited IT deployment and delayed standards enforcement is in part the result of weak central authority in the American healthcare system. While Medicare may be the largest healthcare payer, actual medical authority rests squarely in the hands of physicians and hospital administrators. Together these medical providers have resisted the adoption of EMRs and other HIT platforms under the grounds of uncertain technology standards and privacy security concerns.

Medical providers assert that without national technology standards for EMR and other HIT products, multi-million dollar investments may prove obsolete shortly after implementation. In an effort to alleviate these concerns, President George W. Bush appointed a national coordinator and established the National Institute of Standards and Technology (NIST). Five years later, standards remain unsettled. In the 2009 stimulus bill, the NIST received more than $2 billion and a renewed mandate to create a committee to recommend standards and certification criteria for individual health records systems (Brewin).

However, timely and concrete committee recommendations are unlikely as committee members represent providers, consumers, payers, IT vendors, and federal agencies which hold conflicting interests. For example, established software vendors who operate legacy systems hold a vested interest in the status quo and existing barriers to entry at the expense of new technology companies entering the healthcare industry. Even Microsoft, a victor in the 1990s technology standards wars, is concerned

about provider inaction stemming from interoperability concerns. Peter Neupert, the head of Microsoft's HIT effort explained his view of the situation to *The Economist* stating, "Let's remember HIT is not like railways, where the gauges had to match perfectly for interoperability (The Economist)." Most rail service companies benefitted from a broad network of national routes, but in the HIT standards debate, outcomes will be uneven for IT vendors and the early adopters of EMRs.

Furthermore, even if the standards debate were to be settled quickly, providers would likely still resist EMRs and exchanging health data due to privacy issues. The strength of privacy laws varies across states, and a recent study conducted by MIT and the University of Virginia found that EMR adoption correlated with the strength of a state's privacy laws. The study, which evaluated EMR adoption in 19 states over a 10-year period, found that "the number of hospitals deploying EMR systems was up to 30% lower in states where healthcare providers are forced to comply with strong privacy laws than it was in states with less stringent privacy requirements (Vijayan)." Privacy is an important concern, but it has not prevented multi-hospital organizations like the Veterans Administration or Kaiser Permanente from deploying multi-state EMR systems.

The quality improvement and cost savings achieved through EMR deployment at Veterans Administration (VA) and Kaiser Permanente hospitals are the impetus for much of the legislative enthusiasm for widespread adoption. Breakthroughs like the U.S. Army Medical Department's speech technology and voice-recognition software, which add physician notes to EMRs, will undoubtedly influence future provider use (Monegan, Army Docs Count on Speech Technology to Boost Care). Unfortunately while lessons learned from the VA and Kaiser Permanente may shape clinical use and technological innovation, they do not provide an easily executed roadmap to national EMR adoption. EMR deployment at the VA and Kaiser Permanente benefitted from strong, centralized planning capable of dictating technology standards and physician protocols. Similarly, international health systems have

used strong centralized authority to deploy EMR adoption. This centralized authority is not currently available to the US federal government.

With these facts in mind, I contend that if the United States is to achieve the stated health policy goal of widespread EMR adoption and an electronic infrastructure capable of supporting the exchange of medical data, a supplemental strategy to the 2009 economic stimulus bill is needed. The intended product of this thesis is to analyze the stakeholder interests in the HIT sector, to highlight the provider EMR funding gap after the stimulus incentives are dispersed, and to identify a specific bargaining chip that could be used to build a legislative coalition of providers who will facilitate the widespread adoption of EMRs and the effective exchange of medical information. Hopefully the ideas presented in this thesis will provoke additional academic study of EMR implementation costs and spur a policy discussion of whether the economic stimulus incentives will prove wasteful without a supplemental strategy to ensure widespread adoption.

# The Argument

Waiting for stimulus incentives and the 2016 reductions in Medicare reimbursement to spur widespread EMR adoption will take too long and will likely fail to achieve the federal government's stated policy goal of an interoperable national health information exchange. A supplemental strategy should be developed with financial incentives large enough to overcome provider concerns related to the cost of implementation, the lack of technology standards, and privacy security. This paper argues that health payment system reform is that supplemental strategy which presents the demonstrated savings needed to overcome the costs of comprehensive EMR implementation.

In the first chapter, I examine the interests of EMR stakeholders. The second chapter modifies and updates the 2005 RAND economic model to evaluate the financial costs and benefits to providers of the EMR related 2009 economic stimulus incentives. Chapter three explains the revenue cycle research

design and underlying data sample. Chapter four reports the research findings by place of service, physician specialty, and state where care services were performed. In the fifth chapter, I discuss the immediate financial impact of an improved payment cycle for physicians. Finally I conclude with a focus on how to implement payment reform in exchange for widespread provider adoption of comprehensive EMR systems.

# Chapter 1: HIT Stakeholder Analysis

Healthcare represents the largest sector of the US economy; spending reached an estimated $2.4 trillion in 2008, or $7,804 per person. The US government expects that healthcare spending will continue to rise by 5.5% to more than $2.5 trillion in 2009 (Seligman). It is generally agreed upon that the increasing cost of care and the uneven quality of care delivery stems from the historical misalignment of financial and strategic stakeholder incentives. Protected by high barriers to entry, many healthcare stakeholders hold monopolistic market power which they wield to influence local, regional, and national health policy.

The political and media attention drawn to the HIT debate is in part due to the hope that the deployment of EMRs and other HIT platforms will change the very foundation of the industry and reorganize stakeholder incentives. Conversely, the threat of negatively changing the financial status quo for some of the most lucrative companies and professionals in America makes EMR adoption a difficult proposition. Therefore understanding who may benefit or suffer financially from EMR related programs, and to what extent, is essential to crafting a national adoption strategy.

In the pages that follow, I will analyze the major EMR stakeholders: providers, payers, health information technology developers, and health information exchanges. Whenever possible, the financial impact of EMR adoption for key stakeholders is listed in estimates determined by the 2005 RAND Corporation study, "Extrapolating Evidence of Health Information Technology Savings and Costs." The RAND study's estimates are generally seen as overly optimistic, but for the purpose of proving that the current economic stimulus incentives and potential cost savings estimates are not enough to spur widespread adoption, the RAND estimates will disqualify even a best-case scenario. For a list of common healthcare acronyms and related definitions, please refer to Appendix A. For a visual representation of the key stakeholders and their existing electronic links please see Appendix B.

# Providers

Healthcare providers in the United States vary in scope, size, tax classification, and type of patients served. For the purpose of this thesis, I will analyze claims data for care delivery in military treatment facilities, hospice centers, home settings, skilled nursing facilities, inpatient hospitals, outpatient hospitals, ambulatory surgical centers, physician practice offices, and independent laboratories (See Appendix C for a definition of each place of service). Including claims data from all of these providers offers context to the opportunities that currently exist to co-opt adoption among the two key provider stakeholders: hospitals and physician practices. Consequently I will focus on these providers in this stakeholder analysis, though all providers will be affected by national EMR adoption efforts.

Demonstrated monopolistic market power is most evident with physicians. The reduction in the supply of physicians and the public acceptance of the physician's role at the center of care delivery in the early 1900s has allowed doctors to consolidate medical authority (Starr). Historical efforts to introduce system reforms, expand insurance coverage, and alter care delivery in the United States have succeeded and failed at the discretion of physicians. The circumstances are no different for HIT initiatives. Physicians, as the stakeholders who control the point of care delivery, will determine whether widespread adoption occurs and if medical data will be exchanged. Currently, electronic links between competing hospital systems and physician practices are rare.

**Hospitals**

The American Hospital Association estimates there are 5,708 U.S. hospitals in operation and a total of 945,199 staffed hospital beds (American Hospital Association). About 82% of these hospitals operate as non-profits. In 2008, expenditures on hospital care were estimated to be $746.5 billion, or about 31.4% of total US healthcare expenditures (Englander). Hospitals operate both in-patient and outpatient facilities that provide care for the public.

Median operating margins for hospitals have declined for a second consecutive year from 2.8% in FY 2005, to 2.3% in FY 2006, and now 2.1% in FY 2007 (L. Goldstein). Reported medians have a one year lag, but preliminary reports for FY 2008 indicate even further declines in operating margins. Understandably, median operating cash flow margin has also declined over the same period from 9.6% in FY 2005, to 9.2% in FY 2006, and were 9.0% in FY 2007.

**Physician Practices**

The Bureau of Labor Statistics estimates there are more than 633,000 active physicians in the United States. Each physician follows a structured training program specific to their specialty. The breakdown of physician specialty concentration is as follows: internal medicine, 15.0%; family medicine and general practice, 12.3%; selected surgical specialties, 10.8%; pediatrics, 7.5%; obstetrics & gynecology, 5.5%; anesthesiology, 5.2%; and all other specialties combined represent 38.5% of US physicians (Bureau of Labor Statistics).

Most physicians work under the group practice model. The Medical Group Management Association estimates that there are approximately 39,994 physician group practices in the United States which can vary in size from 1 to 2 physicians, to the more than 3,000 physicians who work at the Mayo Clinic. All told, of the 633,000 active physicians, the American Medical Association estimates 560,118 are office-based group practice physicians (Casalino, Nicholson and Gans). In 2008, expenditures on physician and clinical services were estimated to be $508.5 billion, or about 21.4% of total US health expenditures (Englander)

Physicians and surgeons, as one of the highest compensated occupations in the US, hold a strongly vested financial interest in the current state of care delivery. Median compensation for physicians based on over one year in specialty are: surgery, general - $282,504; obstetrics and gynecology - $247,348; internal medicine - $166,420; pediatrics – $161,331; and family practice – 156,010 (Bureau of

Labor Statistics). For adoption to be widespread, physicians will have to be assured that EMRs do not threaten their financial compensation or medical authority.

**Overall Provider Incentives**

Research on the cost savings potential of EMR systems for providers is fraught with difficulty as time savings estimates are often based on small case studies which are extrapolated nationally. Furthermore, actual cost savings of an EMR system are based on reduced staffing or increased productivity, a step-function of reduced full-time employee requirements.

Proposed efficiency improvements for both hospitals and physician practices include reductions in the clerical staff needed to pull and maintain paper medical records; reduction of nurses' unproductive time, and reduced transcription demands. The RAND Corporation estimates that EMRs could lead to a mean $0.8 billion savings in chart pulls in an outpatient setting and $1.3 billion worth of savings in an inpatient setting (Girosi, Meili and Scoville)[4]. Reducing the time nurses spend on documentation and redundant data collection; the ratio of high- to less-skilled nursing positions; patient assessment; the costs associated with paper forms; and preventing missed charges as a result of EMR adoption could yield $7.1 billion in mean annual savings (Girosi, Meili and Scoville). The adoption of an EMR system could eliminate the slow and costly process of transcribing physician's audio notes leading to an estimated mean annual savings of $0.9 billion (Girosi, Meili and Scoville).

Specific to inpatient hospitals, improved operational efficiency could also lead to reduced length of stay. Under the current prospective payment reimbursement model, RAND estimates that providers could achieve an estimated mean annual savings of $19.3 billion through the adoption of EMR and the reduction of ordering and processing delays (Girosi, Meili and Scoville). All together, RAND estimates the direct cost savings for providers could reach a mean of $29.4 billion annually.

[4] The RAND projections again are stated in non-inflation adjusted 2005 dollars

Estimating the indirect benefits of an EMR adoption for hospitals and physician practices is more difficult. The adoption of an EMR system could bolster a physician's or hospital's reputation for providing high-quality care and increase market demand for services, but branding benefits would likely dissipate quickly if EMR adoption became standard (Congressional Budget Office).

**Overall Provider Concerns**

The collapse of the auction-rate security market in the spring of 2008, the tightening of traditional credit markets in the fall of 2008, and the continuous decline in median operating revenues has raised the level of financial anxiety for physician practices and hospitals. The current effort to achieve widespread adoption of comprehensive EMR systems asks providers to make a substantial upfront capital investment with an uncertain payoff in the most severe economic recession since the Great Depression. The total cost of an EMR implementation for physician practices is estimated to be $22,000 per physician (Girosi, Meili and Scoville). For a hospital, the total upfront cost of EMR implementation is estimated by RAND Corporation to be approximately $63,000 per bed (Girosi, Meili and Scoville)[5].

Comprehensive EMR system adoption also includes a long-term annual increase in hospital liabilities. The annual cost for physician practices to operate and maintain an EMR system is estimated to be $4,400 per physician (Girosi, Meili and Scoville). For hospitals the cost to operate and maintain an EMR system is estimated by the RAND Corporation to be $18,900 per bed per year (Girosi, Meili and Scoville). It is important to note that the annual increase in liabilities does not include an estimate for the annual interest payments that providers would likely pay on the credit needed to finance the large upfront investment in EMR technology.

Besides the upfront implementation and the annual operating costs of an EMR system, physician practices and hospitals are concerned that comprehensive adoption will lead to a reduction in future revenue, an increase in provider competition and the loss of medical authority. Many of the

[5] The RAND projections again are stated in non-inflation adjusted 2005 dollars

industry-wide savings opportunities from EMR adoption come at the expense of provider revenues. A reduction in unnecessary diagnostic testing or radiology, while a positive outcome for the healthcare system, negatively effects providers (Congressional Budget Office). Providers could also face potential declines in revenue as a result of increased competition among local hospitals and physician practices. Widespread EMR adoption improves the portability of medical data and reduces the switching costs for patients interested in choosing a different physician or hospital. Finally, and perhaps of greater consternation to physicians than any financial issue, widespread EMR adoption may lead to the deployment of advanced clinical decision support (CDS) systems, strict medical protocols, and comparative effectiveness boards that increase the scrutiny of clinical decisions.

# Payers

An information technology paradox exists in the current healthcare marketplace for private and public payers as they possess the best breadth of healthcare data but the worst detail. The paradox is the result of being held accountable for an insured patient's total care. For reimbursement purposes, public and private payers are connected to employers, providers, patients, government agencies, and researchers. Standardized claims data are sent to payers from most of these places of service, but currently limited clinical information is included to explain the patient's real-time health status or clinical outcomes. For the increasing number of individual payers who are uninsured, no paradox exists as uninsured consumers do not have access to detailed information or a majority of the healthcare industry stakeholders.

**Private Payers**

Private insurance plans fall into two major divisions: fee-for-service and managed care. Managed care plans are the most popular and are further sub-divided into health maintenance organizations (HMOs), preferred provider organizations (PPOs), and point-of-service plans (PPOs).

In 2008, private health insurance expenditures were an estimated $817.4 billion, or approximately 34.4% of total the US National Healthcare Expenditures (Seligman). The largest managed care organization in the United States is the Blue Cross and Blue Shield Association which includes 39 independently locally operated plans (Seligman). The largest publicly-owned managed care organizations by revenue: UnitedHealth Group, WellPoint, Aetna, Human, CIGNA, Health Net, Coventry Health Care, WellCare Health Plans, Universal American, Molina Healthcare, and Health Spring (Seligman).

**Public Payers**

State and federal government sponsored organizations comprise the public payers' category. Federally sponsored public payers include Medicare, Medicaid, the Federal Employees Health Benefits Program (FEHBP), and military affiliated health plans like Tri-Care. State sponsored public payers include Medicaid and State Employees Health Benefits Programs (SEHBP).

In 2008, total healthcare expenditures by all public payers were an estimated $1.1086 trillion, or approximately 46.6% of total healthcare payments (Seligman). Total federal expenditures were an estimated $810.6 billion with Medicare payments totaling $466.0 billion, Federal Medicaid payments at $198.6 billion, and other federal payments like FEHBP and Tri-care totaled $146.0 billion. State expenditures totaled $298.0 billion with State Medicaid payments at $153.5 billion and SEHBP at $144.5 billion.

**Individual Payers**

The increasingly prominent role of individual payers and out-of-pocket expenditures reflects the rise in consumer directed healthcare plans and uninsured Americans. The Bush administration's push for consumer directed health plan options, like health savings accounts, has led to a 4.5% market penetration for persons under 65 years of age with private health insurance in 2007 (Cohen and

Martinez). A similar movement toward higher deductible plans offered by private health insurance carriers now claims 17.3% of the private market under the age of 65. While legislative successes may have led to the popularity of consumer directed health plans, legislative failures have undoubtedly contributed to the growing population of uninsured Americans. The most recent US Census Bureau Report notes that in 2007, there were 45.7 million people in the US who were without health insurance for at least part of the year (DeNavas-Walt, Proctor and Smith). Between the uninsured and alternative private insurance models, out-of-pocket national healthcare expenditures reached $278.8 billion in 2008 (Seligman).

**Overall Payer Incentives**

Payers undoubtedly stand the most to gain from widespread EMR adoption. Regardless of type, payers would benefit from direct savings associated with a reduction in duplicated diagnostic tests, a reduction in radiology and imaging overuse, and the avoidance of adverse drug events and overprescribing. The RAND Corporation estimates, in 2005 non-inflation adjusted dollars, that mean yearly savings from reduced diagnostic testing as the result of EMR adoption would be $1.1 billion in an outpatient setting and $1.6 billion in an inpatient setting (Girosi, Meili and Scoville). Reduced radiology and imaging as a result of EMR adoption could lead to approximately $1.7 billion in mean annual savings (Girosi, Meili and Scoville). By reducing the occurrence of adverse drug events, eliminating overprescribing, and increasing the use of generic drugs, RAND researchers estimate a mean annual savings of $6.2 billion in an outpatient setting and $2.0 billion in an inpatient setting.

All three types of payers would also benefit indirectly from the greater dissemination of price and quality Information as well as reduced switching costs to receive care from an alternative hospital or physician. Public and private payers have already begun trying to analyze regional and provider discrepancies in price and quality, but the adoption of widespread EMR technology could enable real-time feedback and greater detail on clinical outcomes. With better information on quality and price,

payers could choose any hospital or physician practice with the peace of mind that their EMR or personal health record (PHR) contains all of their prior medical information. The net impact of these indirect savings is difficult to quantify and would likely vary by type of payer, but they would unquestionably make the healthcare market more efficient and dynamic.

Other potential direct savings opportunities would most likely be limited to only public and private payers as they require large institutional resources to collect clinical data for comparative effectiveness research, to develop pay for performance reimbursement models, to eliminate reimbursement fraud, and to perform disease management services. The CBO notes that EMR related clinical data could provide more comprehensive information about the health histories of different patients, and about the outcomes of their treatments, that would make it easier to account for differences among patients who received different treatments (Congressional Budget Office). As a corollary, aggregated data could lead to the redesign of provider reimbursement, from the current fee-for-service and prospective payment models to an outcomes based model as payers better understand best practice care protocols and treatment solutions. Aggregated health data and clinical reporting could also improve healthcare fraud management and achieve an estimated savings of more than $1.03 billion annually (Parente, Mandelbaum and Hanson). The longer-term goal for many payers is also to run effective disease management services. The increasing prevalence of people living with chronic diseases like cancer, diabetes, and heart disease creates an enormous challenge to reducing overall spending. Real-time clinical data could allow payers to coach and ensure that beneficiaries are following the correct procedures that reduce the likelihood of more expensive care interventions in the future.

**Overall Payer Concerns**

The substantial cost savings potential for payers derived from widespread EMR adoption overshadows most of the payer concerns. The most pressing issues for payers are procedural and legal in nature. Many cost savings estimates fail to account for the open enrollment season for private US health plans.

If private plans are expected to provide disease management services, many are concerned that each year enrollees might switch from one plan to another, undermining efforts to deploy HIT in a meaningful way that reduces chronic care costs (Congressional Budget Office). Legally, payers are also concerned with the liability associated with storing and exchanging medical data. Data related legal concerns exist for all HIT stakeholders, but payers in particular have been the target of lawsuits that allege data mishandling that has led to discrimination and identity theft.

# Health Information Technology Developers

HIT developers operate in a global market space. While medical tourism has added a global component to the provider landscape, for the most part payers and providers have a solely domestic focus. Foreign countries purchase US HIT technology and international firms aggressively pursue domestic HIT expenditures; creating market conditions for dynamic innovation.

The success of health information technology developers reflects broader US economic and demographic patterns. The economic shift in the United States from a manufacturing based economy to an information and services based economy has resulted in a workforce familiar with internet applications and an attitude of acceptance toward new technological advances. As the aging baby-boomer workforce retires and displaces their parents as the greatest share of U.S. healthcare consumption, analysts believe EMR and PHR capabilities will be more readily used. Interestingly the same workforce turnover trends are expected to influence provider deployment of HIT. Younger physicians are significantly more likely to purchase EMR systems and are more willing to engage in the delivery process redesigns needed to achieve meaningful clinical use.

**Enterprise EMR Vendors**

Enterprise EMR vendors distribute standard and custom built software and hardware for providers with a range of applications and capabilities like clinical decision support (CDS), controlled medical

vocabulary, order entry, computerized physician order entry (CPOE), clinical documentation, and a clinical data repository. The global EMR market is expected to reach $35 billion by 2015 (Monegain, Global Market for Hospital IT Systems Pegged at $35B by 2015). The United States is the largest market for clinical information systems and is projected to grow at a compounded annual growth rate (CAGR) of about 7.2 percent. The Asia-Pacific region (excluding Japan) is the fastest growing market, with a CAGR of 11.5 percent and includes providers in Australia, China, Thailand, Malaysia, India and the Philippines (The Dorenfest Institute).

Top EMR vendors, based on the total number of installations at 2,726 U.S. acute-care hospitals from May 2007 to May 2008, are: Meditech, 22.9%; Cemer Corporation, 16.8%; McKesson Provider Technologies, 11.6%; Epic Systems Corporation, 9.7%; Siemens Medical Solutions, 8.6%; GE Healthcare, 5.0%; Eclipsys Corporation, 4.8%; CPSI, 4.8%; Dairyland Healthcare Solutions, 1.5%; and 6.3% were self-developed by the hospitals (Modern Healthcare). Even Wal-Mart is entering the EMR System market. Through an alliance with Dell Computers and eClinicalWorks, Walmart plans to distribute a package deal of hardware, software, installation, maintenance, and training that will be priced under $25,000 for the first physician in a practice and about $10,000 for each additional doctor (Lohr, Wal-Mart Plans to Market Digital Health Records System). The enterprise EMR system market is expected to grow even more competitive. U.S. based EMR vendors are likely to face fierce global competition from global technology firms (e.g. Indian outsourcer Infosys Technologies Ltd) who are looking to enter the market either organically or through mergers and acquisitions (J. Goldstein, Infosys Eyes U.S. Acquisitions). Many Wall Street analysts believe the enterprise EMR system market will go through rapid consolidation as providers begin investing the economic stimulus incentives for HIT.

**EMR Vendor Incentives**

First and foremost, enterprise EMR vendors are economically incentivized to support comprehensive widespread adoption through federal and state funding, or reimbursement mandates. Perhaps no

healthcare industry benefitted more from the 2009 economic stimulus bill than EMR vendors. The Health Information and Management Systems Society (HIMSS), which represents 350 health technology companies and about 20,000 members, worked closely with the Obama administration and Congress to secure the substantial stimulus funding for electronic medical record adoption (O'Harrow Jr.).

HIMSS will continue to play a central role in the EMR adoption debate, as the focus turns to interoperability and the establishment of health information exchanges. Among EMR vendors there is considerable disagreement over what type of interoperability standards should be set. Established EMR vendors who have developed advanced technology platforms support strong patent protection and non open-source standards which would establish a substantial barrier to entry. Conversely, new market entrants and web-based developers, support open-source standards.

**EMR Vendor Concerns**

Enterprise EMR applications and capabilities like clinical decision support (CDS), computerized physician order entry (CPOE), and clinical data repositories raise concerns over legal liability should negative clinical outcomes result from a system failure or data security breach. Enterprise software glitches in other industries may result in a package being shipped to the wrong client, but a system glitch at the provider level could have life threatening consequences. As EMR adoption becomes more widespread and as health information exchanges become operational, liability concerns are only expected to grow.

**Personal Health Record (PHR) Internet Portals**

PHRs are electronic medical records controlled by patients who have the option to extend access and use of their health data to other parties. A recent survey of more than 4,000 U.S. consumers 18 and older, by the Deloitte Center for Health Solutions, found only 9 percent of consumers have PHRs, but 42 percent are interested in creating a PHR in the near future (Monegain, Consumer Demand for Healthcare IT 'Never Stronger,' Survey Shows).

Major internet companies like Google (Google Health), Microsoft (Microsoft Health Vault), and Web MD, as well as other start-up firms like Revolution Health, have built substantial internet portals for consumers to create and manage their PHRs (Lohr, Google Offers Personal Health Records on the Web). In order to build support and brand identities, PHR portals have sought partnerships with other healthcare companies and organizations like Walgreens, CVS, the American Heart Association, Quest Diagnostics, the Mayo Clinic and the Cleveland Clinic (Lohr, A Hospital Is Offering Digital Records).

**PHR Incentives**

PHR internet portals strongly support the widespread adoption of EMR systems, but with the caveat that EMR systems provide patients with access to their clinical data via an internet-based PHR. The use of PHR portals has grown rapidly in the past year, but sustained growth will likely depend on greater provider participation and public comfort with having health data online. Greater provider participation would likely change the patient-physician relationship as 55 percent of the public has expressed a desire for the ability to exchange health information via email with their physician. Ensuring public comfort with health data online will likely require government standards. In the previously referenced Deloitte Center for Health Solutions study, 60 percent of those surveyed want the government to set standards for medical information collected, stored, and exchanged through PHRs (Monegain, Consumer Demand for Healthcare IT 'Never Stronger,' Survey Shows)

**PHR Concerns**

PHR portals rely on the clinical data entered by patients, clinical data exchanged via provider EMR systems, and claims data supplied by providers and payers. The potential for data entry and exchange errors has raised legal concerns over who would be liable should medical errors arise if physicians make decisions based on inaccurate information.

For example in April 2009, the Boston Globe reported that Beth Israel Deaconess Medical Center's top technology executive acknowledged that it was a mistake to send insurance claims data to Google Health as a way of summarizing patients' medical histories (Wangsness). The admission of wrongdoing came after a Beth Israel patient had set up a Google Health PHR, and found a list of conditions and serious diagnoses that he had never received from his physicians.

# Health Information Exchanges

A health information exchange (HIE) facilitates the electronic movement of any and all health-related data according to an agreed-upon set of interoperability standards, processes, and activities across nonaffiliated organizations in a manner that protects the privacy and security of the data (Congressional Budget Office). As providers across the country adopt EMR systems to store data electronically, HIEs are expected to serve as a lynch pin to improving the quality of care and reducing system-wide inefficiencies.

Besides identifying EMR standards, the most pressing issue related to HIEs is whether to pursue a bottom-up or top-down approach to achieving nation-wide interoperability. A bottom-up approach would emphasize the creation of regional health information organizations (RHIOs) that would over time link together to form a national health information network (NHIN). Conversely, a top-down approach would start with the creation of a NHIN followed by the rollout of RHIOs. Efforts to create a NHIN and RHIOs have been underway since 2004 and to date have achieved only limited success.

**National Health Information Network (NHIN)**

The first basic test of the NHIN infrastructure, using dummy data, came in late 2007. In March 2009, the Social Security Administration began receiving patient medical data from Bon Secours Richmond Health System through the MedVirginia RHIO. The NHIN connection between the Social Security Administration and Bon Secours Richmond Health System is expected to reduce the processing of disability claims by

two weeks from the current mean time of 65 days (Zieger, National Health Informaiton Network Begins Test Data Exchange)

**Regional Health Information Organizations (RHIO)**

The Indiana Health Information Exchange is considered a RHIO best practice. Started in 2004, the Indiana HIE now connects 39 hospitals, 10,000 physicians and more than 6 million patients enabling the exchange of lab results, reports, medication histories, and treatment histories in real-time (Monegan, "Indiana Leaders Urge Congress to See their Data Exchange as Model). New efforts are continuing to be launched with each passing month. For example, in February 2009, a California RHIO was started across 23 Orange County emergency departments to provide physicians with EMRs on the 360,000 patients enrolled in CalOptima (Merrill, HIE to Link Orange County EDs).

**Overall HIE Incentives**

In addition to the already discussed quality improvement and cost savings opportunities associated with comparative effectiveness research, national EMR adoption coupled with HIEs could create more effective public health policy and natural disaster responses. The potential for a NHIN or RHIOs to play an integral role in addressing public health concerns and in supporting disaster relief response has already been demonstrated. Google Search and Map applications have been able to track disease outbreaks like salmonella and seasonal flu (Madrigal). In the devastating wake of Hurricane Katrina in 2005, RxHub was able to setup an online portal for displaced victims to access their prescription drug information (Conn, ModernHealthcare.com). Widespread adoption of EMRs and the effective deployment of HIEs could build upon the success of both examples.

**Overall HIE Concerns**

As is evident by the limited success of RHIOs and the NHIN since 2004, significant concerns exist and may affect the widespread adoption of EMR systems. The most pressing concern is funding. At the start

of 2006 there were 138 RHIOs in operation, but by the end of 2007 more than 36 of those were defunct. Funding remained a concern even for those exchanging data in 2007 as 40 percent were still heavily dependent on grants (Adler-Milstein, McAfee and Bates). Funding concerns are already present in the effort to spur widespread EMR adoption and could be magnified if any future financing is siphoned to simultaneously support the NHIN or RHIOs. To date, RHIOs have failed to find a sustainable business model that does not heavily rely on federal, state, or private grants.

A second concern related to HIEs involves data protection. In May 2009, the FBI and Virginia State Police started a search for hackers who demanded that the state pay them a $10 million ransom for the return of millions of personal pharmaceutical records stolen from the state's prescription drug database. The hackers claim to have accessed 8 million patient records and 35 million prescriptions collected by the Prescription Monitoring Program (Krebs and Kumar). The May 2009 case is still under investigation, but the threat of foreign or domestic efforts to illegally access data exchanged on the NHIN or RHIOs is real.

# Chapter 2: Revenue Cycle Bargaining Chip Hypothesis

Provider altruism will not be enough to spur widespread adoption of EMRs. A clear and positive financial outcome must be evident to hospitals and physician practices if EMRs are to be adopted quickly and effectively. The extent to which the use of HIT generates savings, and how those savings are distributed across the healthcare sector, will determine the level of provider participation in HIE and future system reforms. I posit that an additional financial bargaining chip is needed if one-time implementation costs are greater than the available stimulus funding and if provider net annual operating margins related to comprehensive EMR systems prove to be negative.

## Are the 2009 stimulus incentives for EMR adoption enough?

To evaluate whether the 2009 economic stimulus incentives for EMR adoption create a clear and positive financial outcome for providers, I intend to update and modify the 2005 RAND Corporation analysis, "Extrapolating Evidence of Information Technology Savings and Costs (Girosi, Meili and Scoville)." As stated earlier, the RAND economic modeling reflects non-inflation adjusted 2005 dollars. To appropriately compare one-time funding and cost projections in 2009 dollars, I have updated the RAND estimates using the Bureau of Labor Statistics' inflation calculator that accounts for increases in the urban consumer price index (CPI-U). The CPI-U index was chosen over the Bureau of Labor Statistics' medical-cost inflation subset database because EMR implementation costs are largely comprised of technology related expenses. For greater detail and a categorization of the updated 2009 hospital and physician statistics, see Appendix D.

The 2005 RAND Corporation study sought to identify the potential health system-wide cost savings related to comprehensive EMR adoption. For the purpose of this study, the RAND economic model has been modified to focus on provider related savings and costs. A detailed accounting of the

unit cost effect, the system cost effect, and the net system effect of available stimulus funding and remaining implementation costs can be found in Appendix E.

| **One-time EMR Implementation Costs and Incentives** | **Net System Effect** |
|---|---|
| *Total economic stimulus incentives available to providers who have yet to implement comprehensive EMR systems* | $ 30,486,556,213 |
| *Cost of Implementing EMRs for the 98.5% of hospital beds that do not currently have a comprehensive EMR system* | $ (64,042,235,661) |
| *Cost of Implementing EMRs for the 96% of office-based physicians that do not currently have a comprehensive EMR system* | $ (12,916,351,550) |
| **Total cost to implement EMRs for the remaining providers without a comprehensive EMR system** | **$ (46,472,030,998)** |

The table above, which summarizes the findings of Appendix E, highlights the one-time EMR implementation costs and incentives. The $32 billion allocated to spur EMR adoption in the 2009 economic stimulus bill has a net system effect of approximately $30.5 billion because hospitals who have already adopted comprehensive EMR systems are also eligible for funding. Even with stimulus funding, provider organizations must still make an estimated $46.5 billion one-time investment to ensure comprehensive EMR systems are present in all U.S. hospitals and physician practices.

The current economic environment coupled with the collapse of the auction-rate securities market has limited the options available to providers to finance a $46.5 billion investment in comprehensive EMRs. To secure financing, most provider organizations would need to demonstrate positive expected financial returns on an EMR investment. Few academic studies have performed provider specific estimates of operational net margins with underlying national provider data. To date, the RAND Corporation study possesses the most robust economic model and projections to determine annual EMR operating savings and expenditures. Updated with 2009 inflation adjusted dollars and provider statistics, I have completed a sensitivity analysis evaluating worst, neutral, and best-case operating scenarios. As was the case with one-time expenditures and funding, the CPI-U index was used

to most accurately project increases in technology related expenses since 2005. A full accounting of the potential EMR related savings and costs can be found in Appendix F.

| Annual EMR Savings and Expenditures | Worst-Case | Neutral-Case | Best-Case |
|---|---|---|---|
| *Total RAND adjusted mean annual savings for providers* | $3,275,576,040 | $24,348,448,540 | $32,100,645,160 |
| *Total RAND adjusted mean annual costs for providers* | $(32,809,115,491) | $(32,809,115,491) | $(32,809,115,491) |
| **Total RAND adjusted mean annual net operating margins for providers** | **$(29,533,539,451)** | **$(8,460,666,951)** | **$(708,470,331)** |

The table above, which summarizes the findings of Appendix F, highlights the annual operational savings, costs, and net margins of EMR systems. The sensitivity analysis revealed that even with best-case outcomes, provider organizations should expect negative financial returns on their investment in comprehensive EMR systems. The negative financial impact could vary widely from a catastrophic $30 billion annual loss to a more manageable annual loss of $700 million across national provider organizations.

Ultimately, the financial case for providers to adopt comprehensive EMR systems is neither clear nor positive. Provider organizations can expect negative returns, and they must live with the uncertainty of just how great those negative financial returns might be each year. In light of these findings, the federal government and other healthcare system stakeholders who stand to gain financially from EMR systems must develop of supplemental strategy. The supplemental strategy should financially compensate providers for the expected losses associated with achieving the stated policy goal of comprehensive and interoperable EMR systems.

## Why is revenue cycle improvement a bargaining chip?

Devising a successful supplemental strategy to garner provider support for the quick and effective adoption of comprehensive medical records requires a financial bargaining chip large enough to compensate for the negative financial impact of EMRs. Fortunately for the public and private payers

who stand the most to gain from comprehensive and interoperable EMR systems, a large enough bargaining chip can be traded: revenue cycle improvement.

The U.S. healthcare payment system processes $1.9 trillion. The system is fragmented, paper based, and labor intensive. Payment processing in healthcare consumes 15 percent or more of each dollar spent, compared with about 2 percent for payment processing in the retail industry. The cost of processing bills, claims, and payments; bad debt; and other transactions totals more than $300 billion annually. The inefficiency is concentrated in the $250 billion that consumers and the $1.3 trillion that insurance companies pay to medical providers (LeCuyer and Singhal).

The cost savings potential of revenue cycle improvement is even greater than the transaction processing costs when you consider that providers fail to fully collect revenues, lose productive time interacting with payers, and provide a risk-free loan to payers as a result of the long revenue cycle. In 2007, hospitals collected only 87.2 percent of their posted net patient revenue, meaning more than $95.5 billion was never received for care provided (Richter, Kerns and Knight). For physicians in 2007, the total weighted mean cost of interacting with payers was $68,824 per practice. To date, I have been unable to find a published analysis of the interest lost on the risk-free loans providers essentially float to payer organizations.

What is certain, in the overwhelmingly uncertain EMR debate, is that the potential cost savings to providers of revenue cycle improvement could finance comprehensive adoption if payers chose to cooperate. Since 2000, revenue cycle improvement, as measured by mean days in accounts receivable (AR), has been a strategic focus for executives at provider organizations. The provider focus on revenue cycle improvement led to a reduction in AR from 68.3 days in 2000 to 49.5 days in 2005. After 2005, providers have only been able to reduce average days AR by 0.4 days because further improvement depends on payer processes (Richter, Kerns and Knight). Exchanging the savings from revenue cycle improvement for cost savings from EMRs, would yield positive returns to all EMR stakeholders.

# Chapter 3: Revenue Cycle Research Design

Recognizing the potential for revenue cycle improvement to serve as a supplemental strategy to spur widespread EMR adoption, I contend that further analysis of the current state of the revenue cycle will reveal provider constituencies most willing to act as early EMR adopters. Targeting providers with the most costly revenue cycles will enable payers and policymakers to leverage adoption momentum as they seek to quickly build a national coalition of providers with comprehensive and interoperable EMR systems. To create a coalition target list, I will evaluate processed insurance claims data by provider type, physician specialty, and state location of provider services.

## Data Sample

The source of the data to be evaluated is a large commercial insurance carrier with a nearly national employer contract. This data represents over 100,000 covered lives for dates of service in 2006 and 2007. The data used is de-identified and was made available through grant-sponsored research on Consumer Driven Health Plans conducted at the University of Minnesota. The data analyzed focused exclusively on physician and ambulatory care provider claims data. The claims data has all of the data fields available in the HCFA-1500 form commonly referred to as the Part B Medicare claims data fields. The HCFA-1500 form is also used as a de facto standard by commercial insurance carriers.

## Evaluation Methodology

Revenue cycle performance will be evaluated by two statistical measurements: mean days AR and mean coefficient of variation (CV). Mean days AR reflects the number of days it takes from the moment a patient receives care from the physician, to the moment the physician receives compensation from the appropriate patient associated payer. Mean days AR is the primary financial metric used by bond rating agencies and a strategic focus for provider organization executives.

The mean CV is an effective measure of financial planning capabilities for hospitals and physician practices. Mathematically, mean CV measures the size of the standard deviation of the sample relative to the size of the sample mean. Practically, the mean CV indicates whether a hospital or physician practice can count on a given payer to reimburse on a consistent time interval for services delivered. The larger the mean days AR and mean CV, the more the revenue cycle costs providers. Both statistical measurements will also be tracked comparatively to identify instances of correlation.

The data sample will be mined using Statistical Analysis Software (SAS) programmed by Professor Stephen Parente. I will then order and analyze the programmed findings in Microsoft Excel. Findings will be displayed graphically in Chapter 4 and numerically in Appendix G.

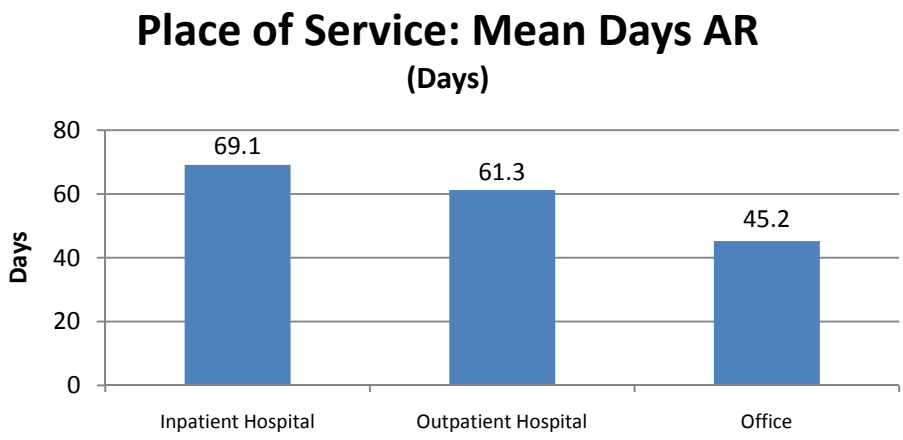
# Chapter 4: Revenue Cycle Research Results

Publicly reported claims processing statistics by public and private payers generally reveal only best-case operations or performance based on skewed sample sets. For example, the heavily cited AthenaHealth, Inc and *Physician Practice* PayerViewSM rankings assert that public and private payers in 2009 are reimbursing physicians 5.3 percent faster and denying 9.0 percent fewer medical claims over the prior year (Physicians Practice). The improvement by payers appears impressive until more thorough reading reveals that these rankings are based on biased data derived from athenahealth's national electronic health records. The study is void of any paper-based claims data, which as noted in chapter two, remain heavily present in system-wide claims processing.

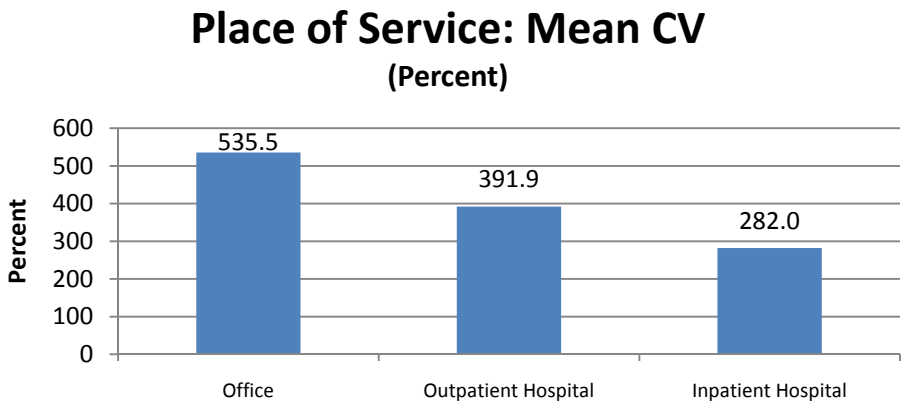
The misleading payment statistics found in payer annual reports and industry journals makes the following results relevant to the ongoing healthcare reform debate. Equipped with accurate and statistically significant claims processing data from more than 100,000 covered lives between 2006 and 2007, physicians and public policymakers can make informed decisions on the future of payment reform initiatives.

## Place of Service Results

The following claims processing results reflect the mean days AR and mean CV for physician claims processed based on the place of care delivery. Appendix C includes a list of place of service codes as well as the CMS definitions used to classify places of service in the US healthcare system.

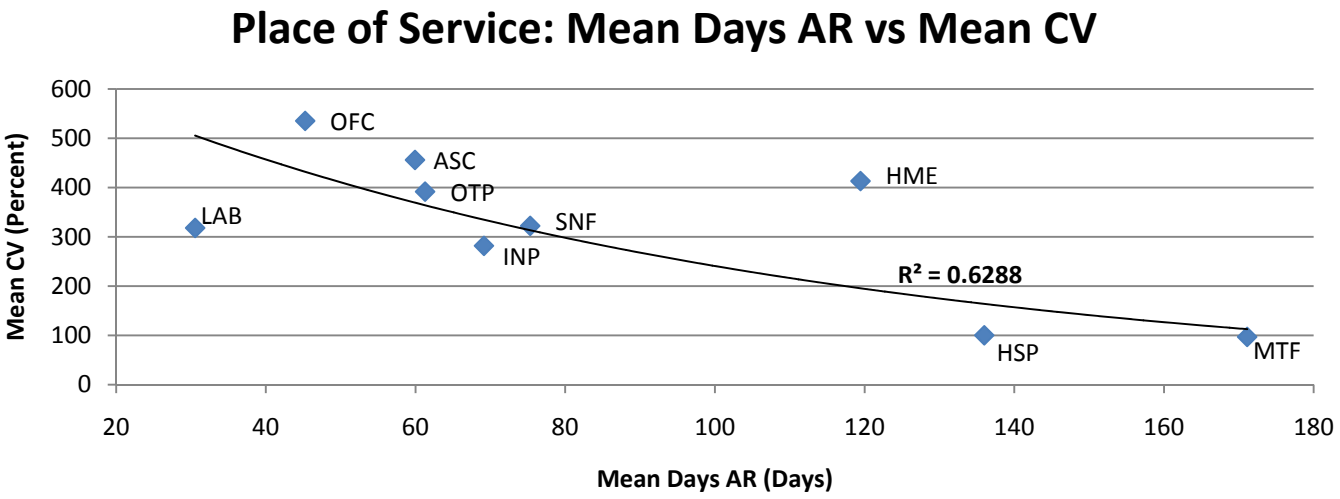



The table above, which graphically summarizes the numerical findings of Appendix G, shows that inpatient hospital claims take substantially longer than outpatient hospital and office-based claims to process. The almost eight day difference between the inpatient and outpatient setting, and the nearly fourteen day difference between inpatient and office-based care delivery, suggests inpatient based physicians would most readily welcome EMR adoption in exchange for payment reform. In the context of other provider organizations, inpatient hospitals had a lower mean days AR (69.1) than military treatment facilities (171.1), hospice centers (136.0), home-based care (119.5), and skilled nursing facilities (75.3). Ambulatory surgical centers (59.9) had a mean days AR lower than outpatient hospitals (61.3) but still greater than office-based claims (45.2). Only independent laboratories (30.5) had a mean days AR lower than office-based physicians.



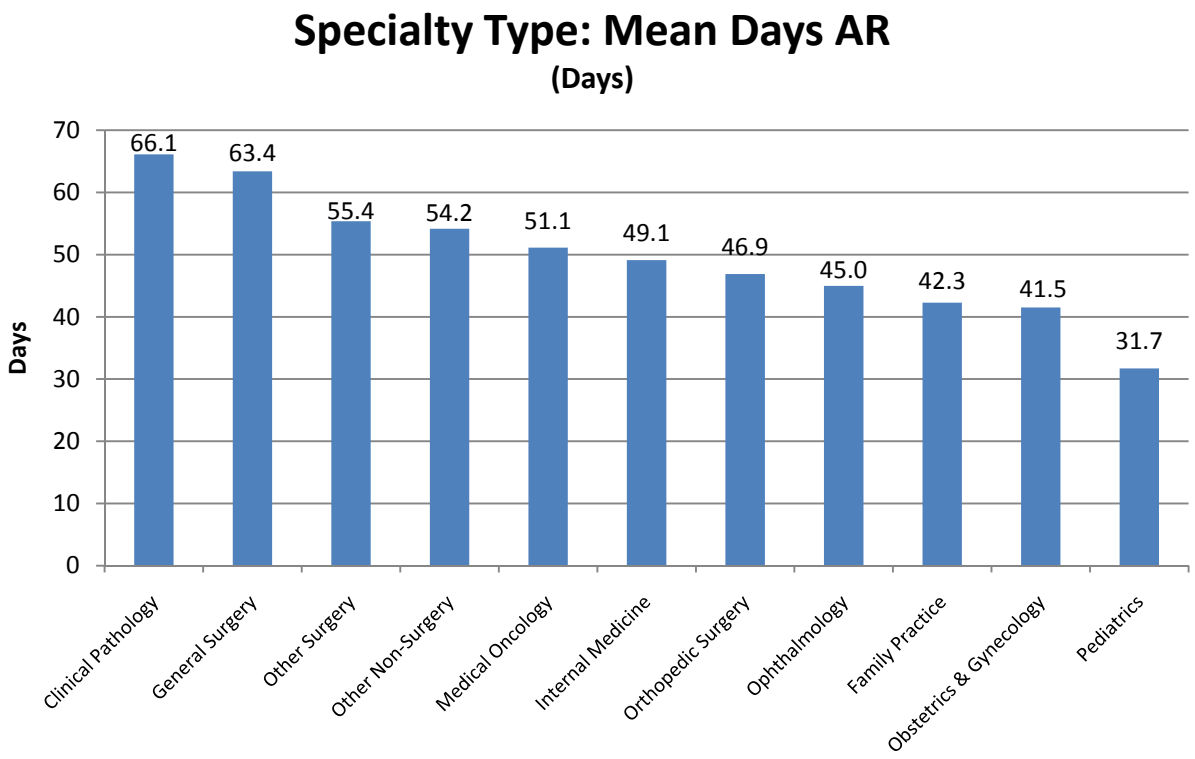
Office-based physician claims processing may benefit from a lower mean days AR, but it has the highest mean CV (535.5) of all provider places of service. Ambulatory surgical centers (456.2) and home-based care (413.4) have the next highest mean CVs. Outpatient hospitals (391.9) rank fourth-worst among provider organizations below skilled nursing facilities (322.4) and independent laboratories (318.2). Inpatient hospitals (282.0) rank third-best to hospice centers (100.5) and military treatment facilities (97.1). The fact that the best mean CV is still close to 100 percent indicates that all provider organizations lack a consistent time interval in which they can expect reimbursement from payers.

The correlation between mean days AR and mean CV for provider places of service can be reviewed graphically, below. The squared correlation coefficient of $R^2$, which equals 0.6288, indicates that the trend line appearing in the graph has correlational value.




# Specialty Type

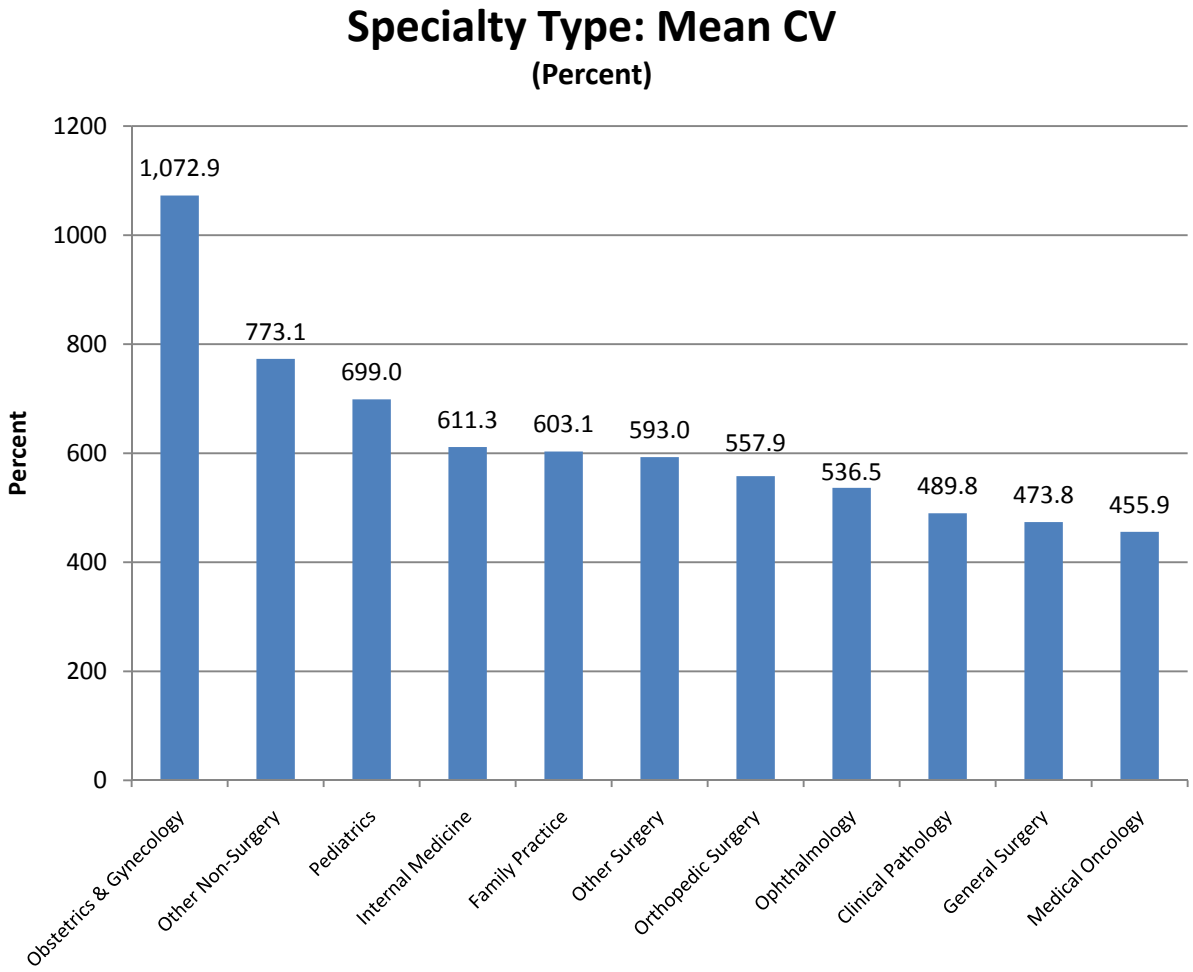
The subsequent claims processing results show the mean days AR and mean CV for physician claims processed based on the type of physician specialty delivering the care services. Appendix G includes the numerical findings displayed graphically below.



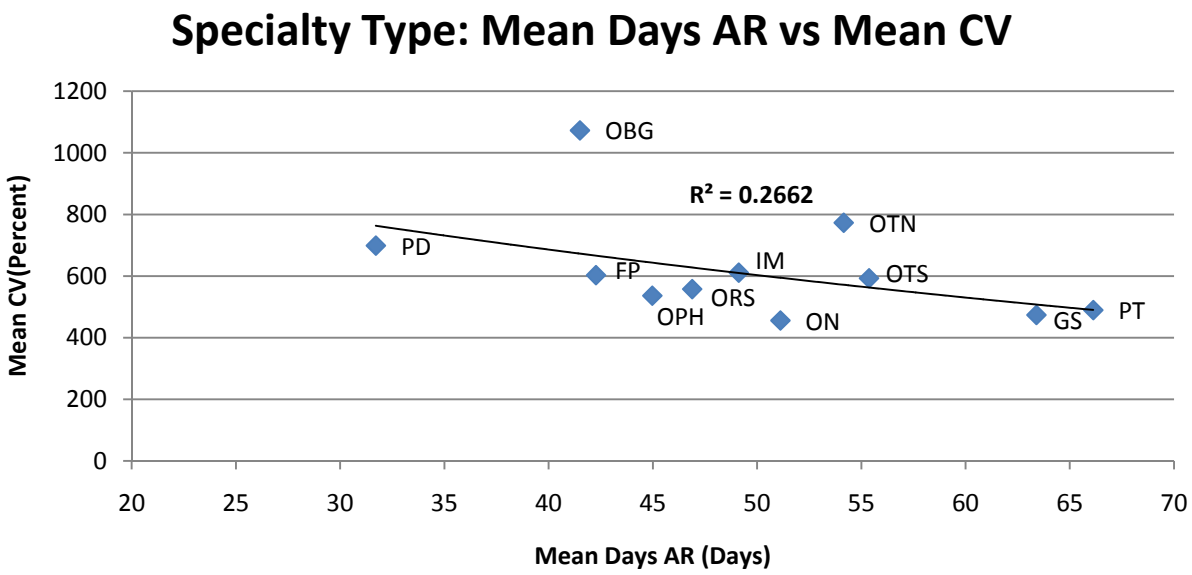

As evident in the graph above profiling mean days AR, clinical pathology (66.1) can expect a revenue cycle more than twice as long as that of pediatrics (31.7). The approximately 34 day range between clinical pathology spans seven other physician specialties: general surgery (63.4), other surgery (55.4), other non-surgery (54.2), medical oncology (51.1), internal medicine (49.1), orthopedic surgery (46.9), ophthalmology (45.0), family practice (42.3), and obstetrics and gynecology (41.5). The substantial differences in mean days AR across physician specialties presents the most ready target list of early-adopters given most physicians identify with their specialty rather than their place of service or state.

Mean CV by specialty type is an even more convincing statistical measurement by which to garner physician support for comprehensive EMR systems in exchange for payment reform. The lowest mean CV, medical oncology (445.9), is almost larger the greatest mean CV for place of service, office-based physicians (535.5). The largest mean CV by physician specialty type, obstetrics and gynecology is

an unfathomable 1,072.9%; mathematically one standard deviation is more than 10.729 times the size of the mean days AR for Obstetrics and gynecologists. Accurate financial planning is nearly impossible for all physician specialties given the large coefficients of variation.




The correlation of mean days AR and mean CV for physician specialties can be reviewed graphically, on the next page. The squared correlation coefficient of $R^2$, which equals 0.2662, indicates that the trend line has poor correlational value.

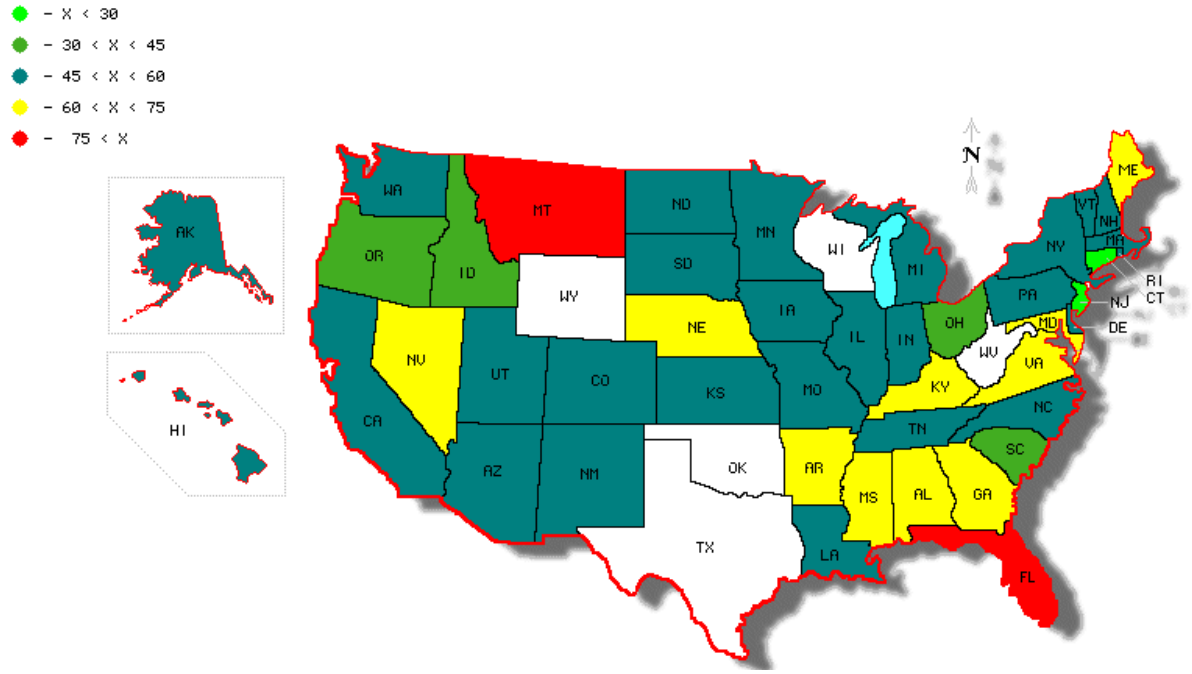



As opposed to the slight case of correlation in the place of service results, there is no correlational link between mean days AR and mean CV by physician specialty. Other non-surgery specialists may best demonstrate this point as they receive substantially less consistency reimbursement than specialties with similar mean days AR.

## State Location of Provider Services

The following claims processing results show the mean days AR and mean CV for physician claims processed based on the state location of services provided. The numerical findings displayed graphically in U.S. political maps on the next two pages can be found in Appendix G. The U.S. political maps organize the results in a manner that should also help inform public policymakers on whether to pursue health information technology through a bottom-up, state and regional focus or a top-down, national information exchange. Currently, claims processing is the largest national electronic exchange of health data and contains important lessons to consider before moving forward with RHIOs or the NIE.

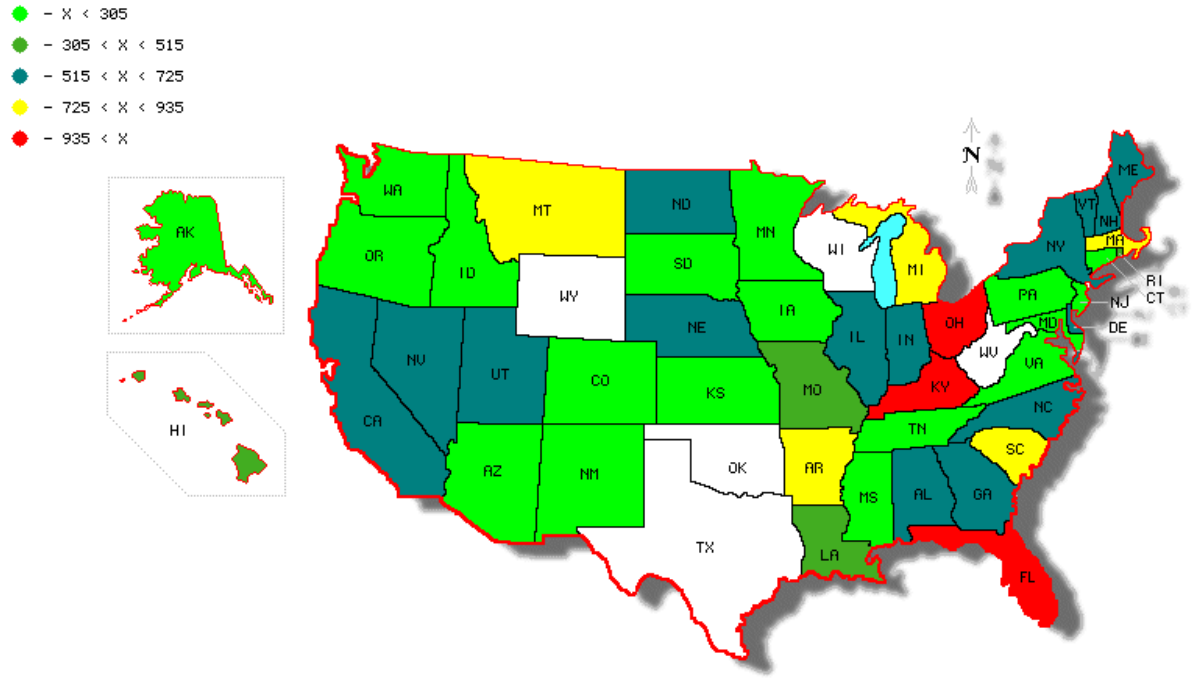
## State Location: Mean Days AR (Days)




*Note: Wyoming (WY), Oklahoma (OK), Texas (TX), Wisconsin (WI), and West Virginia (WV) claims sample sizes proved too small to analyze

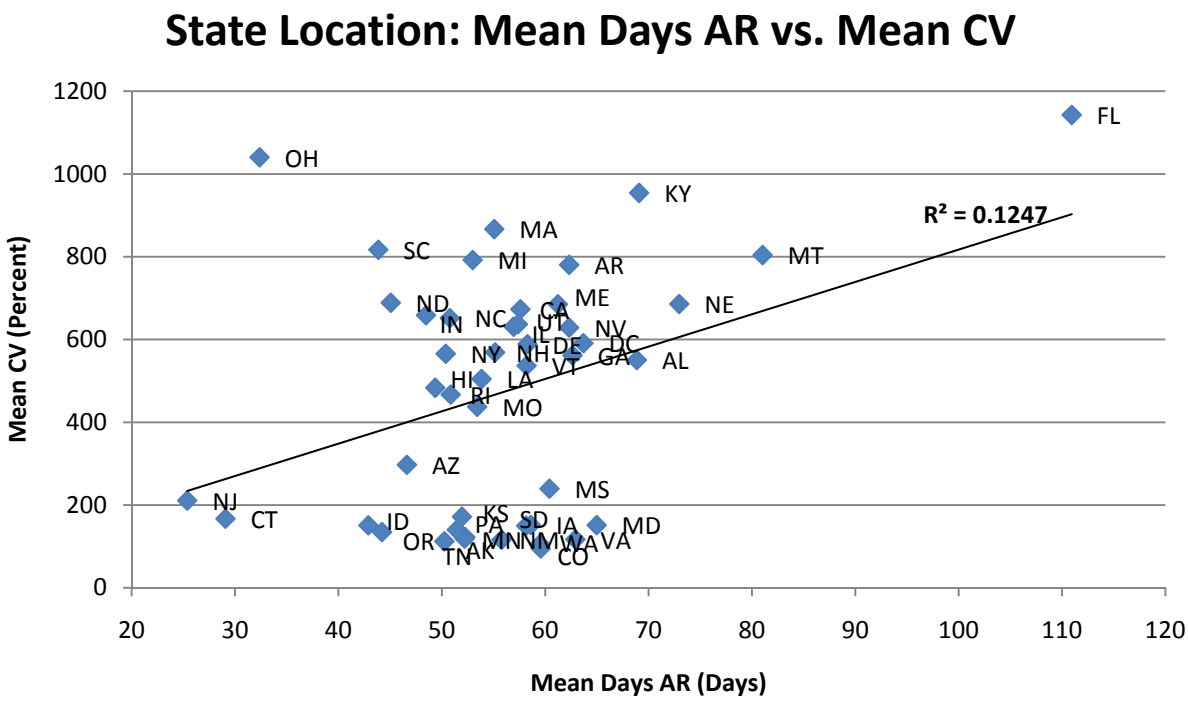
Five categories describe the performance in mean days AR of the forty-six states with statistically significant sample sizes of claims processed. The best performing category colored in bright green, with mean days AR below 30, is comprised of only two states: New Jersey (25.4) and Connecticut (29.1). The worst performing category colored in bright red, with mean days AR above 75, also contains only two states: Montana (81.0) and Florida (110.9). The remaining breakdown of mean days AR shows five states between 30 and 45 days; 26 states between 45 and 60 days; and eleven states between 60 and 75 days. The state by state performance in claims processing based on mean days AR yields an early observation that an interoperable information exchange may prove incredibly difficult to build through a bottom-up approach.

## State Location: Mean CV (Percent)




*Note: Wyoming (WY), Oklahoma (OK), Texas (TX), Wisconsin (WI), and West Virginia (WV) claims sample sizes proved too small to analyze

Five categories also describe the performance based on mean CV for the forty-six states with statistically significant sample sizes of claims processed. The relative best performing category colored in bright green, with a mean CV of less than 305% includes 18 states. Colorado (94.8) has the best mean CV in the country. The worst performing category colored in bright red, with mean CVs above 935% includes three states: Kentucky (954.2), Ohio (1040.3) and Florida (1142.8). The remaining breakdown of mean CVs shows four states between 305% and 515%; 16 states between 515% and 725%; and five states between 725% and 935%. The state by state performance in claims processing based on mean CV also supports the early observation that an interoperable information exchange may prove incredibly difficult to build through a bottom-up approach. Even the best performing states, with the lowest CVs, still experienced significant variation, rendering effective financial planning implausible.




The correlation of mean days AR and mean CV for state location of services delivered can be reviewed graphically, above. The squared correlation coefficient of $R^2$, which equals 0.1247, indicates that the trend line is an especially poor fit. As was the case with the physician specialty results, there is no potential link between mean days AR and mean CV by state location.

# Chapter 5: Discussion and Policy Implications

Targeting providers with the most costly revenue cycles will enable payers and policymakers to leverage adoption momentum as they seek to quickly build a national coalition of providers with comprehensive and interoperable EMR systems. The statistical findings presented in chapter four identify the worst performing revenue cycles as determined by mean days in accounts receivable and the mean coefficient of variation. Although statistically significant and operationally important, mean days AR and mean CV alone will not spur action on payment reform and subsequently EMR adoption unless they are proven to alter the financial outcomes for provider organizations.

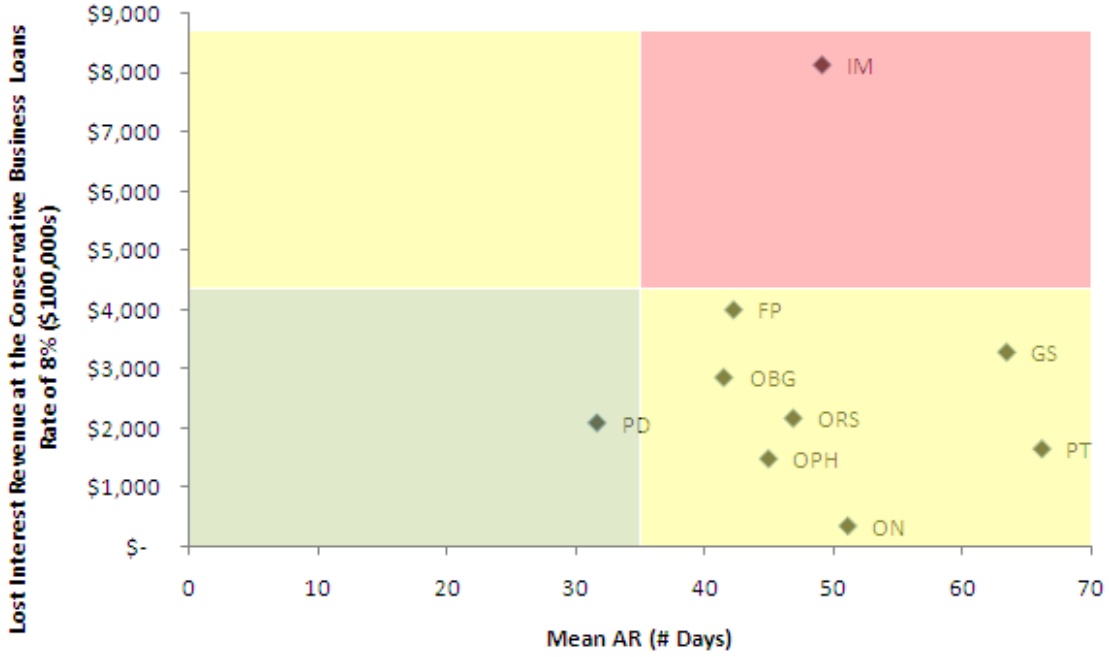
Building a target list of providers with the most costly revenue cycles begins with identifying the annual interest revenue lost as a result of the mean days AR. Current healthcare regulation prevents provider organizations from charging interest on the delayed payments by public and private payers. The effect is essentially an interest free loan financed by provider organizations. Any one day improvement in the revenue cycle is an immediate tangible cost savings to provider organizations.

| | | Cheap Money | Business Loans | Credit Card Loans |
|---|---|---|---|---|
| **Physician Specialty** | | | | |
| Clinical Pathology | PT | $ 102,179,197 | $ 163,925,663 | $ 414,242,460 |
| General Surgery | GS | $ 204,243,446 | $ 327,630,022 | $ 827,551,289 |
| Medical Oncology | ON | $ 20,754,434 | $ 33,275,655 | $ 83,879,375 |
| Internal Medicine | IM | $ 507,645,989 | $ 813,843,478 | $ 2,050,812,057 |
| Orthopedic Surgery | ORS | $ 134,568,092 | $ 215,715,842 | $ 543,383,692 |
| Ophthalmology | OPH | $ 91,879,415 | $ 147,273,278 | $ 370,861,071 |
| Family Practice | FP | $ 249,186,845 | $ 399,376,495 | $ 1,005,254,203 |
| Obstetrics & Gynecology | OBG | $ 177,695,022 | $ 284,786,174 | $ 716,732,584 |
| Pediatrics | PD | $ 129,894,512 | $ 208,093,905 | $ 522,872,340 |
| Comparative Total US Patient Care Physicians | | $ 3,638,889,358 | $ 5,834,309,339 | $ 14,707,458,944 |

The table above highlights the annual lost interest revenue per physician specialty at three potential interest rates: cheap money (5%), business loans (8%), and credit card loans (20%). The additional financial figures used to calculate annual interest revenue per specialty are available in

Appendix H. Especially critical to finding annual lost interest revenue are the figures associated with total patient care physicians in each specialty, the practice revenue per self-employed physician specialists, and the mean days AR per physician specialty.

The policy implications of these findings are displayed graphically below. For policymakers in the Obama administration and the Democratically controlled Congress, EMR coalition building should start with internal medicine physicians who stand the most to gain from payment reform; on average internal medicine physicians lose $813.8 million. Receiving strong support from the legislative representation for internal medicine physicians will most likely be followed by support from clinical pathologists and general surgeons.




Altogether the cost savings potential of payment reform dwarfs even the most dire estimated cost of comprehensive EMR adoption to providers. Specifically, interest revenue recouped for patient care physicians ($5.8 billion), processing transaction costs ($300 billion), and uncollected care revenue (95.5 billion) far outweighs the estimated $29.5 billion it would cost providers to adopt EMR (Richter, Kerns and Knight) (LeCuyer and Singhal).

# Conclusion

The national healthcare debate should not be focused on *if* EMR adoption should occur, but rather, *how* the United States can best promote quick EMR usage in order to facilitate the exchange of health information. As addressed in chapters 3, 4, and 5, health payment system reform is capable of delivering the demonstrated savings providers need to overcome the cost of comprehensive EMR implementation. To achieve these savings, I contend that the Federal Government should begin tackling the *how* of payment reform through the Federal Employee Health Benefits Plans (FEHBP). Through the FEHBP call letter, the federal government can co-opt provider EMR adoption by mandating payment reform in the areas health identification numbers, online insurance verification, payment assurance, and all electronic-transactions.

THE FEHBP is the largest employment-based private health benefit program in the United States available to federal employees ranging from postal workers to U.S. Senators and the Secret Service. Administered by the Office of Personnel Management, the FEHBP enables policymakers to bypass the slow, bureaucratic terrain of CMS and immediately begin efforts toward revenue cycle improvement. The FEHBP's managed competition approach means policymakers can include payment reform requirements in the annual spring "call letter" for the following calendar year's benefits (Feldman, Thorpe and Grey). In any given year more than 200 regional and national health plans participate in the FEHBP. Consequently payment reform in exchange for comprehensive provider EMR adoption could disseminate quickly across the healthcare industry. Furthermore because the role of the Office of Personnel Management is limited to the most basic management functions, FEHBP driven payment reform could be sold as a market-driven solution capable of drawing bi-partisan political support.

The FEHBP should seek to facilitate an organized transition to a healthcare payment process that moves payment functions from the back end to the front end of healthcare delivery. Front end functions like a consumer price estimator, real-time eligibility verification, point of service collections,

chargemaster management, and Medicare compliance reviews can spur improvement in both the retail-oriented payment system and the wholesale, payer-to-provider process (Cain Brothers). If policymakers as a part of overall healthcare reform wish to implement more transparent reimbursement schemes (such as pay for performance) providers and payers need systems that create a basis for predictive cost modeling, interacting cost and care management, and preventative data analysis capabilities (See Appendix I for common definitions). Specific reform requirements for the spring 2009 call letter might include: transferable health identification numbers, required online insurance verification services, payment assurance, and mandated electronic transactions.

Health identification numbers would act like bank account numbers enabling a more straight-forward process to direct payment transactions once initiated in the system. Currently, in most parts of the healthcare transaction system, there is only limited access to incomplete data repositories (Cain Brothers). By contrast, in the banking system when a transaction is initiated, routing and bank account numbers allow disparate institutions to identify the amount of each transaction and process it in a seamless manner. The same cannot be said of healthcare, especially if beneficiaries change plans during the annual open enrollment season. The FEHBP as part of the spring 2009 call letter could require transferable health identification numbers to be issued for all participating health plans.

The introduction of transferable health identification numbers would support universal access to insurance verification systems online. Currently only 64% of payers allow providers access to insurance verification online. Substantial savings from the point of service collection of co-pays, co-insurance, and high deductibles could be reached by providers in 2009 if the remaining 36% of payers who do not offer online insurance verification were required to do so by the FEHBP (Richter, Kerns and Knight).

Health identification numbers would also facilitate the introduction of payment assurance. As part of the 2009 spring call letter, FEHBP could coordinate with payers to establish automatic enrollment

in medical-bill-payment or credit line programs for beneficiaries that make payment transactions automatic. Payment assurance would mean the consumer accepts responsibility for paying any balance after insurance; with the money to be drawn automatically from a designated deposit account or credit line. Payment assurance could minimize changes to the providers' business processes as the payer would be responsible for adjudicating the claim and determining the breakdown of payer-consumer financial responsibility. Providers would receive payments immediately after the payer had completed the adjudication (LeCuyer and Singhal). The benefit to consumers would be greater convenience and clarity as payment assurance would reduce the number of different bills received from payers and providers. Finally, and perhaps most importantly, payment assurance can be implemented without substantial changes to the current claims processing infrastructure.

The last and most pressing requirement that should be included in the spring 2009 FEHBP call letter is the move to all-electronic transactions. McKinsey & Company estimates that even in today's wired world, more than half of the transactions between payers and providers are paper-based. The current annual volume of 2.5 billion claims costs an estimated $15 billion to $20 billion a year in postage, item processing, and accounting. If the FEHBP were to set electronic penetration requirements at 90 percent, from the current performance level of roughly 40 percent, annual payment system savings would exceed $6 billion (LeCuyer and Singhal).

These four recommendations for the 2009 spring FEHBP call letter are by no means an exhaustive list of potential operational improvements related to payment reform and HIT adoption. Public and private industry research should increasingly focus on the implementation issues related to payment reform and HIT. The political reality is that the Obama Administration and the Democratically controlled Congress are committed to EMRs playing a central role in overall healthcare reform.

Recognizing the political commitment to EMRs as a part of overall healthcare reform, this thesis has contributed to the ongoing policy debate: a financial evaluation of the current EMR related provider

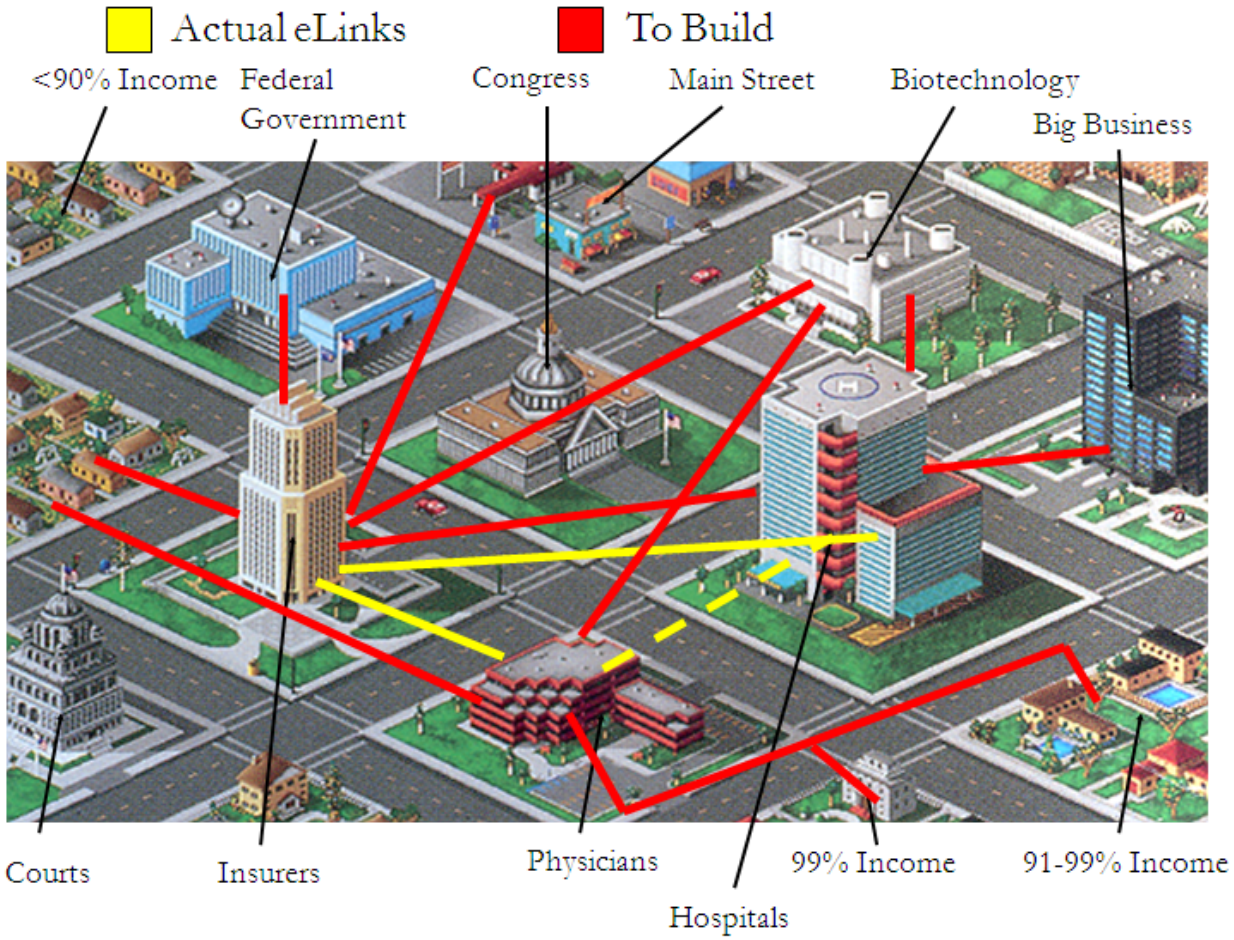
incentives; posited and validated a supplemental funding strategy in the form of revenue cycle improvement; and identified physician constituencies who would most benefit from payment reform. I continue to assert that waiting for stimulus incentives and the 2016 reductions in Medicare reimbursement to spur widespread EMR adoption will take too long and will likely fail to achieve the stated policy goal of an interoperable national health information exchange. If EMR adoption is to succeed, a supplemental strategy like payment reform will need to show providers the money.

# *Appendix A: Healthcare Acronyms*

| **Acronym** – Full Name | **Definition** |
|---|---|
| **CDS –** Clinical Decision Support | Typically used with a CPOE system in hospitals to assist physicians through reminders, suggestions, and support in diagnosing and treating diseases. Features can include: Drug dosing, checks for drug allergies and drug-drug interactions, access to protocols and reminders about preventative medicine tests. |
| **CPOE –** Computerized Physician Order Entry | A process of electronic entry of physician instructions for the treatment of patients. The orders are communicated over a computer network to other medical staff (nurses, therapists, pharmacists, other physicians), or to the departments (pharmacy, laboratory, or radiology) responsible for fulfilling the order/instructions.<br>• Seeks to reduce medical errors related to handwriting<br>• Error-checking for duplicate or incorrect doses or tests |
| **CPT4 –** Current Procedural Terminology, Version 4 | Coding system run by the AMA to describe the medical, surgical, and diagnostic procedures performed on a patient |
| **EMR/EHR –** Electronic Medical Record/Electronic Health Record | The electronically stored version of what is currently recorded by a physician with a pen and paper. Definitions vary by study and healthcare organization. Terminology often seeks to distinguish between standard and customized records |
| **HIE –** Health Information Exchange | The electronic movement of any and all health-related data according to agree-upon set of interoperability standards, processes and activities across nonaffiliated organizations in a manner that protects the privacy and security of that data; and the entity that organizes and takes responsibility for the process. |
| **HIPAA –** Health Insurance Portability and Accountability Act | Enacted by Congress in 1996.<br>• Title I: Protects health insurance coverage for workers and their families when they change or lose their jobs<br>• Title II: Administrative simplification provisions that require the creation of national standards for electronic healthcare transactions and national identifiers for providers, health insurers, and employers. Meant to help keep people's information private.<br>• HITECH ACT: A revision to HIPPA in the 2009 Stimulus bill which imposes notification requirements on entities in the event of security breaches relating to protected health information. |
| **HIT** – Health Information Technology | All the hardware, software, and other kit needed to make sense of the data and give remote access to them (The Economist) |
| **HL7 –** Health Level Seven | All-volunteer, not-for-profit organization started in 1987 that seeks to set standards for the exchange, integration, sharing, and retrieval of electronic health information: Patient registration data, Patient orders, Clinical information (e.g. vital signs), Referral information, Clinical trial data, and Other operational transactions |

| | |
|---|---|
| **ICD9/ICD 10–** International Classification of Diseases, Version 9 or Version 10 | Provides diagnoses codes to classify diseases and a wide variety of signs, symptoms, and causes of injury or disease.<br>• Each condition can be assigned a unique category and given a code, up to 6 characters long<br>• First published by the World Health Organization (WHO) to track morbidity and mortality stats worldwide<br>• There is an ICD 10 but the US still uses ICD 9 which was bought by the US Dept of HHS because the Medicare/Medicaid reimbursement process uses ICD9 |
| **Interoperability** | Refers to the goal of setting specific standards that developers must meet allowing RHIOs or a NHIE. So far the federal government has tried to address the Interoperability issue through certifications of platform developers by a committee within HHS but most believe without Medicare and other national insurance carriers setting specific standards, the goal of interoperability will remain unmet in the near future. |
| **NDC –** National Drug Code Directory | Run by the FDA and established under the Drug Listing Act of 1972 requiring all drugs intended for human use to be registered. Drug products are identified and reported using the NDC.<br>• Unique 11-digit, 3-segment number |
| **PHR –** Personal Health Record | Electronic medical record controlled by the patient and typically in an electronic format. Patients are able to decide who can access, use, and control the information. The information entered into the record can vary by platform and individual, but it often includes data received from providers as well as insurance |
| **RHIO –** Regional Health Information Organizations | A multi-stakeholder governance entity that convenes non-affiliated health and healthcare-related organizations. First appeared as an idea in 1986 but the movement has so far failed to catch on and the tacit participation by providers has been seen as a stall tactic and a boon to territorial system vendors.<br>• Also known as regional Health Information Exchanges (HIEs).<br>• Deciding whether to deploy Regional HIEs or a National Health Information Exchange (NHIE) is a critical element of the HIT debate |

## *Appendix B: Health Information Technology Stakeholders*




(S. T. Parente)

# *Appendix C: Place of Service (POS) Codes and Definitions*

| POS Code | POS Title | POS Definition |
|---|---|---|
| OFC | Office | Location, other than a hospital, SNF, or ICF, where the health professional routinely provides health examinations, diagnosis and treatment of illness or injury on an ambulatory basis. |
| HME | Home | Location, other than a hospital, or other facility, where the patient receives care in a private residence. |
| INP | Inpatient Hospital | A facility, other than psychiatric, which primarily provides diagnostic, therapeutic (both surgical and nonsurgical) and rehabilitation services by or under the supervision of physicians to patients admitted for a variety of medical conditions. |
| OTP | Outpatient Hospital | A portion of a hospital which provides diagnostic, therapeutic (both surgical and nonsurgical), and rehabilitation services to sick or injured persons who do not require hospitalization or institutionalization. |
| ASC | Ambulatory Surgical Center | A freestanding facility, other than a physician's office, where surgical and diagnostic services are provided on an ambulatory basis. |
| MTF | Military Treatment Facility | A medical facility operated by one or more of the Uniformed Services. MTF also refers to certain former U.S. Public Health Service (USPHS) facilities now designated as Uniformed Service Treatment Facilities (USTF). |
| SNF | Skilled Nursing Facility | Skilled Nursing Facility (SNF).--A facility which primarily provides inpatient skilled nursing care and related services to patients who require medical, nursing, or rehabilitative services but does not provide the level of care or treatment available in a hospital. |
| HSP | Hospice | A facility, other than a patient's home, in which palliative and supportive care for terminally ill patients and their families are provided. |
| LAB | Independent Laboratory | A laboratory certified to perform diagnostic and/or clinical tests independent of an institution or a physician's office. |

# *Appendix D: Updated 2009 Hospital and Physician Statistics*

| | | |
|---|---|---|
| **US Hospitals** | | |
| Total Staffed Beds in All U.S. Hospitals | | 945,199 |
| Estimated # of beds with comprehensive EMRs based on NEJM study findings that 1.5% of hospitals have implemented a comprehensive EMR system | | 14,178 |
| Estimated # of beds without comprehensive EMRs based on NEJM study findings that 98.5% of hospitals have not implemented a comprehensive EMR system | | 931,021 |
| 2005 RAND mean estimated cost per bed to implement EMRs | $ | (63,000) |
| *2009 inflation adjusted RAND mean estimated cost per bed to implement EMRs* | $ | (68,787) |
| 2005 RAND mean annual estimated cost per bed to maintain and operate EMRs | $ | (18,900) |
| *2009 inflation adjusted RAND mean annual estimated cost per bed to maintain and operate EMRs* | $ | (20,636) |
| | | |
| **Physician Practices** | | |
| Total US office-based physicians | | 560,118 |
| Estimated # of physicians who have comprehensive EMR systems based on NEJM study findings that 4% of physician practices have comprehensive EMR systems | | 22,405 |
| Estimated # of physicians without comprehensive EMR systems based on NEJM study findings that 96% of physician practices do not have comprehensive EMR systems | | 537,713 |
| 2005 RAND mean estimated cost per physician to implement EMRs | $ | (22,000) |
| *2009 inflation adjusted RAND mean estimated cost per physician to implement EMRs* | $ | (24,021) |
| RAND mean annual estimated cost per physician to maintain and operate EMRs | $ | (4,400) |
| *2009 inflation adjusted RAND mean estimated cost per physician to maintian and operate EMRs* | $ | (4,804) |
| | | |

NOTE: All values in 2009 inflation adjusted dollars based on the Bureau of Labor Statistics Inflation Calculator reflecting changes in prices of all goods and services purchased for consumption by urban households (CPI-U)

# *Appendix E: Full EMR Implementation Costs and Incentives*

| | Unit Cost Effect | System Cost Effect | Net System Effect |
|---|---|---|---|
| **Available Stimulus Funding for Remaining Implementation:** | | | |
| Total Stimulus Authorization for EMR Adoption | | $ 32,000,000,000 | |
| Estimated # of beds with comprehensive EMRs based on NEJM study findings that 1.5% of hospitals have implemented a comprehensive EMR system | 14178 | | |
| RAND mean estimated cost per bed to implement EMRs | $ (68,787) | | |
| Total EMR incentives eligible for hospitals who have already implemented comprehensive EMR systems | | $ (975,262,472) | |
| Estimated # of physicians who have comprehensive EMR systems based on NEJM study findings that 4% of physician practices have comprehensive EMR systems | 22,405 | | |
| RAND mean estimated cost per physician to implement EMRs | $ (24,021) | | |
| Total EMR incentives eligible for the 4% of physician practices who have already implemented comprehensive EMR systems | | $ (538,181,315) | |
| *Total economic stimulus incentives available to providers who have yet to implement comprehensive EMR systems* | | | **$ 30,486,556,213** |
| **Remaining Implementation Costs:** | | | |
| Estimated # of beds without comprehensive EMRs based on NEJM study findings that 98.5% of hospitals have not implemented a comprehensive EMR system | 931,021 | | |
| RAND mean estimated cost per bed to implement EMRs | $ (68,787) | | |
| Cost of Implementing EMRs for the 98.5% of hospital beds that do not currently have a comprehensive EMR system | | $ (64,042,235,661) | |
| Estimated # of physicians without comprehensive EMR systems based on NEJM study findings that 96% of physician practices do not have comprehensive EMR systems | 537,713 | | |
| RAND mean estimated cost per physician to implement EMRs | $ (24,021) | | |
| Cost of Implementing EMRs for the 96% of office-based physicians that do not currently have a comprehensive EMR system | | $ (12,916,351,550) | |
| *Total cost to implement EMRs for the remaing providers without a comprehensive EMR system* | | | $ (76,958,587,211) |
| **Net Funding for Provider EMR Adoption** | | | $ (46,472,030,998) |

NOTE: All values in 2009 inflation adjusted dollars based on the Bureau of Labor Statistics Inflation Calculator reflecting changes in prices of all goods and services purchased for consumption by urban households (CPI-U)

# *Appendix F: Sensitivity Analysis of Annual Net Margins*

| | Worst-Case | Neutral-Case | Best-Case |
|---|---|---|---|
| ***Savings:*** | | | |
| RAND estimated mean annual transcription savings | $ 982,672,810 | $ 982,672,810 | $ 982,672,810 |
| RAND estimated mean annual paper record management savings | $ 2,292,903,230 | $ 2,292,903,230 | $ 2,292,903,230 |
| RAND estimated mean annual length of stay savings | | $ 21,072,872,500 | $ 21,072,872,500 |
| RAND estimated mean nursing staff savings | | | $ 7,752,196,620 |
| *Total 2009 RAND adjusted mean annual savings for providers* | $ 3,275,576,040 | $ 24,348,448,540 | $ 32,100,645,160 |
| | | | |
| ***Costs:*** | | | |
| RAND estimated annual lost revenue from lab tests | $ (2,948,018,430) | $ (2,948,018,430) | $ (2,948,018,430) |
| RAND estimated annaul lost revenue from radiology services | $ (1,856,159,750) | $ (1,856,159,750) | $ (1,856,159,750) |
| *Annual hospital operating costs if all 945,199 hospital beds had a comprehensive EMR system based on RAND's mean estimated operating cost per bed of $20,636* | $ (19,505,126,564) | $ (19,505,126,564) | $ (19,505,126,564) |
| *Annual physician practice operating costs if all 560,118 office-based physicians had a comprehensive EMR system based on RAND's mean estimated opearting cost per physician of $4,804* | $ (2,690,806,872) | $ (2,690,806,872) | $ (2,690,806,872) |
| Annual 12.5% interest payment on the $46,472,030,998 in credit needed to fund system-wide EMR implementation | $ (5,809,003,875) | $ (5,809,003,875) | $ (5,809,003,875) |
| *Total RAND Estimated Annual Costs for Providers* | $ (32,809,115,491) | $ (32,809,115,491) | $ (32,809,115,491) |
| | | | |
| **Net Operating Margin** | | | |
| *Total RAND Estimated Annual Savings for Providers* | $ 3,275,576,040 | $ 24,348,448,540 | $ 32,100,645,160 |
| *Total RAND Estimated Annual Costs for Providers* | $ (32,809,115,491) | $ (32,809,115,491) | $ (32,809,115,491) |
| *Total RAND Estimated Net Operating Margin* | $ (29,533,539,451) | $ (8,460,666,951) | $ (708,470,331) |

NOTE: All values in 2009 inflation adjusted dollars based on the Bureau of Labor Statistics Inflation Calculator reflecting changes in prices of all goods and services purchased for consumption by urban households (CPI-U)

# *Appendix G: Revenue Cycle Statistical Breakdowns*

- *Ordered by mean_place_delta*
- *Mean_place_delta: Mean AR (# Days)*
- *Mean_cv_delta: Mean Co-efficient of Variation (%)*

| AR by Place of Service | _FREQ_ | mean_place_delta | mean_cv_delta |
|---|---|---|---|
| Military Treatment Facility | 127 | 171.1259843 | 97.14487323 |
| Hospice | 2470 | 135.9963563 | 100.4570345 |
| Home | 26839 | 119.4566116 | 413.3945467 |
| Skilled Nursing Facility | 87379 | 75.31781092 | 322.4085381 |
| Inpatient Hospital | 1248074 | 69.138108 | 282.0220403 |
| Outpatient Hospital | 1098093 | 61.27251153 | 391.9340029 |
| Ambulatory Surgical Center | 91078 | 59.92139704 | 456.2090199 |
| Office | 6591848 | 45.24544498 | 535.4699655 |
| Independent Laboratory | 1110565 | 30.5405852 | 318.2490982 |

| AR by Physician Specialty | _FREQ_ | mean_specialty_delta | mean_cv_delta |
|---|---|---|---|
| Clinical Pathology | 403171 | 66.12734051 | 489.8078654 |
| General Surgery | 109827 | 63.39734309 | 473.8443092 |
| Other Surgery | 552641 | 55.36866791 | 592.964326 |
| Other Non-Surgery | 5973432 | 54.15556802 | 773.149421 |
| Medical Oncology | 125688 | 51.11884985 | 455.8676634 |
| Internal Medicine | 1155232 | 49.11936477 | 611.2874728 |
| Orthopedic Surgery | 328063 | 46.88520802 | 557.9045623 |
| Ophthalmology | 306273 | 44.97297183 | 536.5278905 |
| Family Practice | 1107294 | 42.27098946 | 603.1273573 |
| Obstetrics & Gynecology | 233359 | 41.50231617 | 1072.871271 |
| Pediatrics | 378779 | 31.71202733 | 698.9738873 |

| AR by State | _FREQ_ | mean_state_delta | mean_cv_delta | Classification |
|---|---|---|---|---|
| FL | 4674 | 110.9422336 | 1142.809723 | |
| MT | 3679 | 81.03533569 | 803.9668056 | Group 5 |
| NE | 12566 | 72.96506446 | 685.8198693 | |
| KY | 7072 | 69.08130656 | 954.2247905 | |
| AL | 11227 | 68.86933286 | 550.3142963 | |
| MD | 14793 | 64.98330291 | 151.3963187 | |
| DC | 44527 | 63.69802592 | 590.8687155 | |
| VA | 5942 | 62.92544598 | 116.9614066 | |
| GA | 12828 | 62.64546305 | 561.5685955 | |
| NV | 10285 | 62.32250851 | 628.7088698 | |
| AR | 2E+06 | 62.31849245 | 780.4840838 | |
| ME | 488586 | 61.22860868 | 685.1918491 | |
| MS | 8712 | 60.40955005 | 239.3355578 | Group 4 |
| CO | 537 | 59.5698324 | 94.79054205 | |
| WA | 1743 | 59.49741824 | 105.5080055 | |
| IA | 10930 | 58.61646844 | 151.5821967 | |
| DE | 246496 | 58.28591945 | 588.4229044 | |
| VT | 32845 | 58.19659004 | 536.7236337 | |
| SD | 11765 | 58.1639609 | 149.7260059 | |
| CA | 20797 | 57.59763427 | 673.0249218 | |
| UT | 12067 | 57.37250352 | 636.8431182 | |
| IL | 186562 | 56.94775463 | 630.9611925 | |
| NM | 1766 | 55.79105323 | 116.1249782 | |
| NH | 16712 | 55.15928674 | 568.8989037 | |
| MA | 6762 | 55.07290742 | 866.8111913 | |
| LA | 21935 | 53.84444951 | 504.5309121 | |
| MO | 132871 | 53.41927885 | 437.3137249 | |
| MI | 525026 | 52.98688446 | 792.1651649 | |
| MN | 5909 | 52.26891183 | 122.2500071 | |
| AK | 1008 | 52.21130952 | 118.7172306 | |
| KS | 6144 | 51.94873047 | 171.6908436 | |
| PA | 17552 | 51.44536235 | 139.934923 | |
| RI | 29671 | 50.85575141 | 466.7851057 | |
| NC | 324855 | 50.77881209 | 651.5280729 | |
| NY | 607047 | 50.37864449 | 565.4463804 | |
| TN | 1665 | 50.24264264 | 112.3139564 | |
| HI | 277158 | 49.36655265 | 483.2509993 | |
| IN | 15765 | 48.46298763 | 658.6852021 | |
| AZ | 212380 | 46.61823618 | 297.1721196 | Group 3 |
| ND | 65601 | 45.05852045 | 688.7705193 | |
| OR | 5326 | 44.21028915 | 134.6977794 | |
| SC | 2E+06 | 43.85701388 | 816.8674751 | |
| ID | 12981 | 42.8900701 | 150.7666143 | |
| OH | 259675 | 32.37223067 | 1040.336773 | Group 2 |
| CT | 887 | 29.06538895 | 166.7752232 | |
| NJ | 259612 | 25.36839206 | 210.6389126 | Group 1 |

# *Appendix H: Interest Revenue Lost by Physician Specialty*

| **All Patient Care Physicians** | | | |
|---|---|---|---|
| | Cheap Money | Business Loans | Credit Card Loans |
| Total Patient Care Physicians | 732,234 | 732,234 | 732,234 |
| Practice Revenue per Self-employed Physician | $ 703,473 | $ 703,473 | $ 703,473 |
| Mean AR (Delta) | 51.39190083 | 51.39190083 | 51.39190083 |
| Discount/Interest rate for loan | 0.05 | 0.08 | 0.2 |
| Days in Year | 365 | 365 | 365 |
| Total Yearly Revenue | $515,106,782,781 | $515,106,782,781 | $515,106,782,781 |
| Daily Total Revenue | $1,411,251,460 | $1,411,251,460 | $1,411,251,460 |
| Mean AR Days of Earnings | 72526895060 | 72526895060 | 72526895060 |
| Compounded Interest for Mean AR Days | 0.00706434 | 0.011326408 | 0.028552253 |
| Lost Interest for Mean AR | $ 512,354,633 | $ 821,469,170 | $ 2,070,806,223 |
| **Lost Interest for Year** | **$ 3,638,889,358** | **$ 5,834,309,339** | **$ 14,707,458,944** |

| **Patient Care Clinical Pathologists (PT)** | | | |
|---|---|---|---|
| | Cheap Money | Business Loans | Credit Card Loans |
| Total Patient Care Clinical Pathologists | 12,718 | 12,718 | 12,718 |
| Practice Revenue per Self-employed Physician | $ 882,972 | $ 882,972 | $ 882,972 |
| Mean AR (Delta) | 66.12734051 | 66.12734051 | 66.12734051 |
| Discount/Interest rate for loan | 0.05 | 0.08 | 0.2 |
| Days in Year | 365 | 365 | 365 |
| Total Yearly Revenue | $11,229,635,098 | $11,229,635,098 | $11,229,635,098 |
| Daily Total Revenue | $30,766,124 | $30,766,124 | $30,766,124 |
| Mean AR Days of Earnings | 2034481929 | 2034481929 | 2034481929 |
| Compounded Interest for Mean AR Days | 0.009099066 | 0.014597595 | 0.036888328 |
| Lost Interest for Mean AR | $ 18,511,886 | $ 29,698,543 | $ 75,048,636 |
| **Lost Interest for Year** | **$ 102,179,197** | **$ 163,925,663** | **$ 414,242,460** |

| **Patient Care General Surgery Physicians (GS)** | | | |
|---|---|---|---|
| | Cheap Money | Business Loans | Credit Card Loans |
| Total Patient Care General Surgery Physicians | 29,718 | 29,718 | 29,718 |
| Practice Revenue per Self-employed Physician | $ 787,994 | $ 787,994 | $ 787,994 |
| Mean AR (Delta) | 63.39734309 | 63.39734309 | 63.39734309 |
| Discount/Interest rate for loan | 0.05 | 0.08 | 0.2 |
| Days in Year | 365 | 365 | 365 |
| Total Yearly Revenue | $23,417,612,230 | $23,417,612,230 | $23,417,612,230 |
| Daily Total Revenue | $64,157,842 | $64,157,842 | $64,157,842 |
| Mean AR Days of Earnings | 4067436704 | 4067436704 | 4067436704 |
| Compounded Interest for Mean AR Days | 0.008721788 | 0.013990753 | 0.035338842 |
| Lost Interest for Mean AR | $ 35,475,320 | $ 56,906,501 | $ 143,738,501 |
| **Lost Interest for Year** | **$ 204,243,446** | **$ 327,630,022** | **$ 827,551,289** |

NOTE: All monetary values are in 2009 medical-cost inflation adjusted dollars based on the Bureau of Labor Statistics CPI-U subset database for medical costs tracked since 1936

| **Patient Care Medical Oncology Physicians (ON)** | | | |
|---|---|---|---|
| | Cheap Money | Business Loans | Credit Card Loans |
| Total Patient Care Medical Oncology Physicians | 4,589 | 4,589 | 4,589 |
| Practice Revenue per Self-employed Physician | $ 643,640 | $ 643,640 | $ 643,640 |
| Mean AR (Delta) | 51.11884985 | 51.11884985 | 51.11884985 |
| Discount/Interest rate for loan | 0.05 | 0.08 | 0.2 |
| Days in Year | 365 | 365 | 365 |
| Total Yearly Revenue | $2,953,663,730.55 | $2,953,663,730.55 | $2,953,663,730.55 |
| Daily Total Revenue | $8,092,229.40 | $8,092,229.40 | $8,092,229.40 |
| Mean AR Days of Earnings | 413665459.6 | 413665459.6 | 413665459.6 |
| Compounded Interest for Mean AR Days | 0.007026675 | 0.011265891 | 0.028398417 |
| Lost Interest for Mean AR | $ 2,906,692.59 | $ 4,660,310.11 | $ 11,747,444.35 |
| **Lost Interest for Year** | **$ 20,754,433.99** | **$ 33,275,654.60** | **$ 83,879,375.21** |

| **Patient Care Internal Medicine Physicians (IM)** | | | |
|---|---|---|---|
| | Cheap Money | Business Loans | Credit Card Loans |
| Total Patient Care Internal Medicine Physicians | 108,986 | 108,986 | 108,986 |
| Practice Revenue per Self-employed Physician | $ 689,967 | $ 689,967 | $ 689,967 |
| Mean AR (Delta) | 49.11936477 | 49.11936477 | 49.11936477 |
| Discount/Interest rate for loan | 0.05 | 0.08 | 0.2 |
| Days in Year | 365 | 365 | 365 |
| Total Yearly Revenue | $75,196,735,832.98 | $75,196,735,832.98 | $75,196,735,832.98 |
| Daily Total Revenue | $206,018,454.34 | $206,018,454.34 | $206,018,454.34 |
| Mean AR Days of Earnings | 10119495608 | 10119495608 | 10119495608 |
| Compounded Interest for Mean AR Days | 0.006750905 | 0.010822856 | 0.027272621 |
| Lost Interest for Mean AR | $ 68,315,749.40 | $ 109,521,848.35 | $ 275,985,165.83 |
| **Lost Interest for Year** | **$ 507,645,989.47** | **$ 813,843,477.71** | **$ 2,050,812,057.49** |

| **Patient Care Orthopedic Surgery Physicians (ORS)** | | | |
|---|---|---|---|
| | Cheap Money | Business Loans | Credit Card Loans |
| Total Patient Care Orthopedic Surgery Physicians | 21,351 | 21,351 | 21,351 |
| Practice Revenue per Self-employed Physician | $ 978,240 | $ 978,240 | $ 978,240 |
| Mean AR (Delta) | 46.88520802 | 46.88520802 | 46.88520802 |
| Discount/Interest rate for loan | 0.05 | 0.08 | 0.2 |
| Days in Year | 365 | 365 | 365 |
| Total Yearly Revenue | $20,886,397,756.29 | $20,886,397,756.29 | $20,886,397,756.29 |
| Daily Total Revenue | $57,223,007.55 | $57,223,007.55 | $57,223,007.55 |
| Mean AR Days of Earnings | 2682912613 | 2682912613 | 2682912613 |
| Compounded Interest for Mean AR Days | 0.006442858 | 0.010328054 | 0.026016152 |
| Lost Interest for Mean AR | $ 17,285,624.61 | $ 27,709,266.14 | $ 69,799,061.50 |
| **Lost Interest for Year** | **$ 134,568,091.91** | **$ 215,715,842.33** | **$ 543,383,692.29** |

NOTE: All monetary values are in 2009 medical-cost inflation adjusted dollars based on the Bureau of Labor Statistics CPI-U subset database for medical costs tracked since 1936

| **Patient Care Ophthalmology Physicians (OPH)** | | | |
|---|---|---|---|
| | Cheap Money | Business Loans | Credit Card Loans |
| Total Patient Care Ophthalmology Physicians | 17,595 | 17,595 | 17,595 |
| Practice Revenue per Self-employed Physician | $ 845,068 | $ 845,068 | $ 845,068 |
| Mean AR (Delta) | 44.97297183 | 44.97297183 | 44.97297183 |
| Discount/Interest rate for loan | 0.05 | 0.08 | 0.2 |
| Days in Year | 365 | 365 | 365 |
| Total Yearly Revenue | $14,868,969,524.55 | $14,868,969,524.55 | $14,868,969,524.55 |
| Daily Total Revenue | $40,736,902.81 | $40,736,902.81 | $40,736,902.81 |
| Mean AR Days of Earnings | 1832059582 | 1832059582 | 1832059582 |
| Compounded Interest for Mean AR Days | 0.006179273 | 0.00990474 | 0.024941948 |
| Lost Interest for Mean AR | $ 11,320,795.52 | $ 18,146,073.96 | $ 45,695,135.65 |
| **Lost Interest for Year** | **$ 91,879,415.46** | **$ 147,273,278.28** | **$ 370,861,071.33** |

| **Patient Care Family Practice Physicians (FP)** | | | |
|---|---|---|---|
| | Cheap Money | Business Loans | Credit Card Loans |
| Total Patient Care Family Practice Physicians | 79,947 | 79,947 | 79,947 |
| Practice Revenue per Self-employed Physician | $ 536,754 | $ 536,754 | $ 536,754 |
| Mean AR (Delta) | 42.27098946 | 42.27098946 | 42.27098946 |
| Discount/Interest rate for loan | 0.05 | 0.08 | 0.2 |
| Days in Year | 365 | 365 | 365 |
| Total Yearly Revenue | $42,911,864,043.30 | $42,911,864,043.30 | $42,911,864,043.30 |
| Daily Total Revenue | $117,566,750.80 | $117,566,750.80 | $117,566,750.80 |
| Mean AR Days of Earnings | 4969662884 | 4969662884 | 4969662884 |
| Compounded Interest for Mean AR Days | 0.005806945 | 0.009306902 | 0.02342602 |
| Lost Interest for Mean AR | $ 28,858,560.24 | $ 46,252,163.33 | $ 116,419,424.14 |
| **Lost Interest for Year** | **$ 249,186,844.78** | **$ 399,376,495.08** | **$ 1,005,254,202.83** |

| **Patient Care Obstetrics & Gynecology Physicians (OBG)** | | | |
|---|---|---|---|
| | Cheap Money | Business Loans | Credit Card Loans |
| Total Patient Care Obstetrics & Gynecology Physicians | 37,190 | 37,190 | 37,190 |
| Practice Revenue per Self-employed Physician | $ 838,097 | $ 838,097 | $ 838,097 |
| Mean AR (Delta) | 41.50231617 | 41.50231617 | 41.50231617 |
| Discount/Interest rate for loan | 0.05 | 0.08 | 0.2 |
| Days in Year | 365 | 365 | 365 |
| Total Yearly Revenue | $31,168,829,661.40 | $31,168,829,661.40 | $31,168,829,661.40 |
| Daily Total Revenue | $85,394,053.87 | $85,394,053.87 | $85,394,053.87 |
| Mean AR Days of Earnings | 3544051023 | 3544051023 | 3544051023 |
| Compounded Interest for Mean AR Days | 0.005701049 | 0.00913689 | 0.022995172 |
| Lost Interest for Mean AR | $ 20,204,808.19 | $ 32,381,605.05 | $ 81,496,061.11 |
| **Lost Interest for Year** | **$ 177,695,022.13** | **$ 284,786,174.22** | **$ 716,732,583.84** |

NOTE: All monetary values are in 2009 medical-cost inflation adjusted dollars based on the Bureau of Labor Statistics CPI-U subset database for medical costs tracked since 1936

| Patient Care Pediatrics Physicians (PD) | | | |
|---|---|---|---|
| | Cheap Money | Business Loans | Credit Card Loans |
| Total Patient Care Pediatrics Physicians | 54,790 | 54,790 | 54,790 |
| Practice Revenue per Self-employed Physician | $ 544,596 | $ 544,596 | $ 544,596 |
| Mean AR (Delta) | 31.71202733 | 31.71202733 | 31.71202733 |
| Discount/Interest rate for loan | 0.05 | 0.08 | 0.2 |
| Days in Year | 365 | 365 | 365 |
| Total Yearly Revenue | $29,838,419,223.20 | $29,838,419,223.20 | $29,838,419,223.20 |
| Daily Total Revenue | $81,749,093.76 | $81,749,093.76 | $81,749,093.76 |
| Mean AR Days of Earnings | 2592429496 | 2592429496 | 2592429496 |
| Compounded Interest for Mean AR Days | 0.004353264 | 0.006974026 | 0.01752346 |
| Lost Interest for Mean AR | $ 11,285,529.64 | $ 18,079,670.13 | $ 45,428,334.09 |
| **Lost Interest for Year** | **$ 129,894,512.08** | **$ 208,093,904.80** | **$ 522,872,340.19** |

NOTE: All monetary values are in 2009 medical-cost inflation adjusted dollars based on the Bureau of Labor Statistics CPI-U subset database for medical costs tracked since 1936

# *Appendix I: Revenue Cycle Terminology*

| Term | Definition |
|---|---|
| **Billing** | Department responsible for bill preparation and distribution |
| **Business Office** | All in-house functions related to billing and collections |
| **Collections** | In-house department charged with following up on claims, managing denials, and posting cash |
| **Coding** | Translating transcribed documentation into the appropriate ICD-9 codes and/or feeding them into an electronic grouper designed to assign DRGs |
| **First-Pass Yield** | The percentage of claims that arrive in the business office error-free |
| **Mid-cycle** | All revenue cycle functions that generally occur between the patient access and business office segments; usually includes case management, coding/HIM, medical records, and utilization review |
| **Medical Records** | All coding and transcription functions that take place during and after case management |
| **Medical Transcribers** | Responsible for turning physician documentation into readable and reproducible (digital) files |
| **Patient Access** | All in-house functions related to scheduling, pre-registration, registration and admission |
| **Pre-registration** | Responsible for collecting patient information and/or often verifying insurance prior to patient visit |
| **Registration** | Responsible for collecting patient information and admitting at the time of patient visit |
| **Scheduling** | Charged with scheduling appointments and coordinating with physician offices |
| **Self-Pay** | All claims and revenue stemming from patient obligations |
| **Outsourcing** | Any external service contracted by the hospital to perform a revenue cycle function |
| **Utilization Review** | Responsible for monitoring the appropriateness of medical procedures; often outsourced; generally makes determinations based on physician documentation |

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