

ABSTRACT

Electronic Medical Records, Healthcare, and the Patient

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After several decades of development, Electronic Medical Records (EMRs) are now exerting a more significant impact on healthcare practices than ever before. Although most of the reasons for implementing EMRs focus on improving medical care as a whole, one must also consider the effects increased EMR use may have at the level of the patient-physician encounter. In this paper, both the advantages and disadvantages of EMR use, especially with respect to the patient-physician relationship, are examined, particularly in terms of patient trust, security of patient information, and quality of healthcare. The United States healthcare system stands on the brink of a new age of electronic health information technology. The potential for innovation within this new technology represents a great opportunity for the future of medicine. However, in seeking to implement EMRs caution must be exercised to ensure that implementation does not have adverse effects on the personal nature of the patient-physician relationship—an important issue that must be addressed in order preserve the integrity of healthcare in the new electronic age.

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TABLE OF CONTENTS

ACKNOWLEDGMENTS.....	iii
Chapter	
ONE	
Introduction to Electronic Medical Records.....	1
TWO	
EMRs from the Healthcare Provider’s Perspective.....	9
THREE	
EMRs from the Patient’s Perspective.....	19
FOUR	
Conclusions.....	30
BIBLIOGRAPHY.....	36

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CHAPTER ONE

Introduction to Electronic Medical Records

Electronic medical records (EMR) software is a rapidly changing and often misunderstood technology with the potential to cause great change within the medical field. Unfortunately, many healthcare providers fail to understand the complex functions of EMRs, and they rather choose to use them as a mere alternative to paper records.¹ EMRs, however, have many functionalities and uses that could help to improve the patient-physician relationship and the overall quality of patient care. In order for this potential to be realized, both the patient and the healthcare provider must have a deeper understanding of EMR purpose and function. In this chapter I will provide an introduction to the modern EMR in terms of the basic definition, the historical development, relevant government legislation, and its potential effects on the patient physician relationship in order to provide an adequate backdrop for understanding many of the current problems and benefits associated with EMR implementation.

Definitions: EMR vs. EHR

In order to investigate the effects of electronic medical records, a definition for the electronic medical record must first be established, as the term has become increasingly ambiguous and is often confused with the electronic health record (EHR). Although many people, including those within the healthcare industry have used the terms EMR and EHR interchangeably, “these terms describe completely different concepts, both of which are crucial to the success of local, regional, and national goals to

¹ Eta S. Berner, Don E. Detmer, and Donald Simborg, “Will the Wave Finally Break? A Brief View of the Adoption of Electronic Medical Records in the United States” 12, no. 1 (2005): 3–7.

improve patient safety, improve the quality and efficiency of patient care, and reduce healthcare delivery costs.”² The term EMR refers to the computerized application that is used to create the legal record of patient information and data at the point of contact between the patient and the healthcare providers. It is the record of what occurred during the patient visit. It may include assessments, plans, prescriptions for medications, and notes by the care providers. The EMR exists within a software application sold by any of a number of vendors including but not limited to industry leaders Epic, Siemens, and MEDITECH.³

The term EHR, on the other hand, consists of a compilation of encounters documented in EMRs which gives a more complete view of the health history of the patient across multiple healthcare providers and over an extended period of time.⁴ The existence of an effective EHR is dependent upon clinical EMR software that is both compatible with other vendors’ software and can share data with other providers across a national network. Increasingly, it is the goal of healthcare policy to implement EMRs in such a way that an EHR can be created, maintained, and accessed throughout a patient’s lifetime. However, the creation of an EHR is the topic of another discussion entirely which possess its own set of dilemmas and questions. From this point forward, EMRs will be the sole topic of this discussion.

² Dave Garets and Mike Davis, “Electronic Medical Records Vs. Electronic Health Records: Yes, There Is a Difference,” *HIMSS Analytics Database* (January 26, 2006).

³ *2010 Top 20 Best in KLAS Awards: Software & Professional Services* (KLAS, 2010), <http://www.klasresearch.com/Research/Segments/?id=10>.

⁴ Garets and Davis, “Electronic Medical Records Vs. Electronic Health Records: Yes, There Is a Difference.”

Tracing the Development of EMRs

To understand many of the issues that physicians and patients face when encountering modern EMR systems, it is important to understand the process that has led to the creation of many of the EMR systems as they stand today. Beginning in the 1960s, computers were first introduced into the healthcare setting for administrative and business purposes. This was similar to many other industries that were beginning to implement computers at the time. However, it didn't take long for people to recognize the vast potential of computers to revolutionize the way that medical information was processed. Specifically, "early work in medical informatics focused on clinical computing with a clear goal—to improve clinical decisions and reduce medical errors."⁵ In a sense, the basic models and goals for the earliest EMR systems bear a striking similarity to those of modern EMRs.

These early pioneers of medical informatics were met with resistance on many fronts. Healthcare administrators, whose approval was needed to allocate the necessary funding, were often unwilling to invest in these novel systems for a variety of reasons. The effectiveness of the early EMRs was uncertain, and this uncertainty gave the administrators little reason to do away with their reliable paper records. Additionally, the cost of implementing such systems was prohibitive given the minimal perceived benefits.

Physicians, too, had little motivation to endorse the adoption of EMRs, for a variety of reasons. In the 1970's and 1980's, physicians viewed these intrusive computer systems as awkward and restrictive. Up until the widespread use of the Windows

⁵ Berner, Detmer, and Simborg, "Will the Wave Finally Break?".

operating system in the early 1990's, the user interfaces for these early EMRs were cumbersome and difficult to navigate.⁴ The shortcomings in the interface, no matter how nuanced the software, obstructed the physicians workflow, and thus these early systems were unable to help optimize patient care.

More importantly, many physicians feared that the advent of EMRs and healthcare computer programs could undermine some of the most basic tenets of their existence. In an age when the physician was the gate keeper to the entire healthcare system, physicians only sought the adoption of technologies that advanced their autonomy, not technologies that limited their autonomy.⁴ The clinical decision support software elements that were being introduced seemed to take the art out of the practice of medicine by reducing its practice to mathematical formulas and binary decision trees.⁶ Physicians were worried that shifting some of their responsibilities of remembering facts and decision making to computers could limit their clinical freedom and also devalue their profession in the eyes of the public.⁷ Physicians were well respected for their ability to make tough decisions and perform complex procedures. Allowing computers to perform these same functions in place of the physicians seemed to undercut the thousands of years that had been spent refining the art of medicine.

By the 1990's, advances in computer technology and networking began to make widespread implementation of EMRs appear more feasible. In 1991, the Institute of Medicine (IOM) released its first of many reports that addressed the increasingly pressing

⁶ A L Komaroff, "Algorithms and the "Art' of Medicine.," *American Journal of Public Health* 72, no. 1 (January 1982): 10–12.

⁷ WB Schwartz, "Medicine and the Computer. The Promise and Problems of Change.," *The New England Journal of Medicine* 283, no. 23 (1970): 1258–1264.

issue of EMRs, entitled *The Computer-based Patient Record: An essential technology for health care*. The report seriously considered models for an electronic record that could be created to complement the unique problems facing the United States healthcare system in the coming years.⁸ The influence of the IOM reports coupled with greater technological feasibility enabled more effective EMR software to continue to be developed throughout the 1990's.

By the early 2000's computer technology and industry attitudes appeared to be more conducive than ever to the widespread implementation of EMR software. User interfaces were less cumbersome, and physicians were becoming increasingly comfortable using computers to perform tasks. Despite these factors, however, widespread implementation had yet to be achieved. By 2001, only 18.1% of office based physicians demonstrated any level EMR use, let alone the fully functional levels prescribed in the IOM reports.⁹ EMR use in hospital settings was even lower.¹⁰ In 2001, the IOM released a report entitled *Crossing the Quality Chasm*, in which the recognized that a dramatic change was needed to push EMR usage to an effective level. The report states that "in the absence of a national commitment and financial support to build a national health information infrastructure, the committee believes that progress on quality

⁸ Institute of Medicine (U.S.). Committee on Improving the Patient Record, Richard S. Dick, and Elaine B. Steen, *The Computer-based Patient Record: An Essential Technology for Health Care* (National Academies, 1991).

⁹ "Products - Health E Stats - EMR and EHR Use by Office-based Physicians - Preliminary 2010", n.d., http://www.cdc.gov/nchs/data/hestat/emr_ehr_09/emr_ehr_09.htm.

¹⁰ Ashish K. Jha et al., "Use of Electronic Health Records in U.S. Hospitals," *New England Journal of Medicine* 360 (April 16, 2009): 1628-1638.

improvement will be painfully slow.”¹¹ It would take a few more years, but eventually the United States government would pledge the commitment and support that the IOM prescribed.

Government Legislation and Meaningful Use

In 2009, the United States government demonstrated that strong national commitment to EMR implementation by passing the Health Information Technology for Economic and Clinical Health Act (HITECH Act) as a part of the American Recovery and Reinvestment Act.¹² The passage of this act represented the first formal attempt by the government to push healthcare providers to implement EMRs on a national scale. Starting in 2011, the government began providing incentives to physicians and hospitals for demonstrating “meaningful use” of clinical EMR applications. These incentives programs are scheduled to continue until the year 2015, at which point healthcare providers who fail to demonstrate “meaningful use” will be penalized by the implementation of reimbursement cuts.¹³ While this is certainly a bold step towards the widespread use of EMRs, this system of implementation is not without its share of potential pitfalls that may affect both physicians and patients.

One of the major issues concerning the HITECH act is the ambiguity surrounding the term “meaningful use.” The Centers for Medicare & Medicaid Services (CMS) has published over 900 pages of criteria for defining “meaningful use,” but such a convoluted and technical definition has resulted in a lack of understanding of the term on the part of

¹¹ Committee on Quality of Health Care in America, Institute of Medicine, *Crossing the Quality Chasm: A New Health System for the 21st Century* (Washington, D.C.: The National Academies Press, 2001).

¹² *American Recovery and Reinvestment Act of 2009*, 2009, www.gpo.gov/fdsys/pkg/PLAW-111publ5/content-detail.html.

¹³ *Ibid.*

many healthcare providers. Unknowingly, many of these providers have adopted EMR software that is not capable of performing all of the duties outlined by CMS.¹⁴ Consequently, some patients may be receiving sub-optimal care according to the “meaningful” use guidelines, because their physician’s EMR lacks several important functions. Additionally, hospital administrators and physicians who are eager to receive their part of the incentives in this tough economic climate may be pushing themselves to implement EMRs at a faster rate than is appropriate to ensure staff proficiency with the software. Such economic pressure on the healthcare providers is excellent for convincing them to adopt EMRs, but unfortunately it may also pressure some providers into adopting EMRs too hastily. These issues concerning the definition of “meaningful use” and proper implementation standards must be addressed if EMRs are to be successfully introduced into the desired scope of clinical settings.

Preserving the Patient-physician Relationship

It appears that the HITECH act will be able to persuade healthcare providers to adopt EMRs at a faster rate than ever before, and healthcare providers must also be intentional about preserving the integrity of the patient-physician relationship during this transition period and beyond. When everyone is focused on the clinical or fiscal effects of EMR software implementation, it is easy to lose sight of the abstract notion of the relationship between the patient and the physician. The interaction between the patient and the physician during a clinical encounter has remained roughly the same throughout the course of modern medicine in terms of the way that information has been documented and presented to the patient. The paper record provided a concrete, confidential, and

¹⁴ Jonathan P Tomes, “Avoiding the Trap in the HITECH Act’s Incentive Timeframe for Implementing the EHR,” *Journal Of Health Care Finance* 37, no. 1 (Fall 2010): 91–100.

portable method of record keeping as the physician interacted with the patient, pen in hand and file in front of him. The EMR has changed this mode of interaction by moving the record from a tangible paper held by the physician, to an abstract electronic database displayed on a computer screen. The way that physicians present data to patients and the way in which patients receive this information has been forever changed, and this change must not be overlooked.

The adoption of EMRs has been a long time coming for the medical system, and it finally appears that EMRs are here to stay. As this mode of information management is established, however, the interactions that constitute the patient-physician relationship will change. Both the patient and the physician will be presented with their own unique set of challenges as they adapt to this new paradigm for medical information and clinical practice. Over the course of the next two chapters, I will examine the positive and negative impact of EMRs from the both the perspective of the healthcare provider (Chapter 2) and the perspective of the patient (Chapter 3) in terms of the patient-physician relationship and the quality of care.

CHAPTER TWO

EMRs from the Healthcare Provider's Perspective

In order to understand the effects of EMR use on the patient-physician relationship, I will first examine how EMR implementation may affect each entity, the healthcare provider and the patient, separately. In this chapter I will focus on the perspective of the healthcare provider. Specifically, I will discuss the effects of EMR use in terms of three areas in which EMRs have a substantial impact for the physician: cost of implementation, efficiency and workflow, and communication with the patient.

Cost of Implementation

As discussed in chapter 1, one of the most historically controversial factors affecting the implementation of EMRs has been the potential costs weighed against the financial gains of implementation. For years, healthcare administrators cited financial unfeasibility as one of the primary reasons for choosing not to implement EMR technology. And for many years they were right.¹ However, the current climate surrounding EMR implementation, coupled with the incentives outlined in the HITECH act, suggests that the adoption of EMRs can have a positive financial impact on the healthcare provider. This attitude of financial hope concerning EMRs is essential if the patient is to benefit from the widespread physician use of EMRs.

Nevertheless, transitioning to the full use of an EMR system can be financially strenuous for physicians that have only used paper records, and the increased costs of this transition have the potential to be passed on to the patient in a variety of ways. One study suggests that up-front costs associated with EMR implementation can range from

¹ Berner, Detmer, and Simborg, "Will the Wave Finally Break?".

\$16,000 to \$36,000 per physician for small group or solo practicing physicians.² While some may assume that “meaningful use” incentives from the HITECH act cover all over these costs, this is not so. With a maximum first year payout of \$18,000 per physician, these incentives cannot cover all of the costs of EMR implementation.³ The payouts from the HITECH act are certainly helpful in offsetting some of the costs. However, these payouts assume that providers are meeting the criteria defined under “meaningful use.” In reality, many providers do not meet all of those criteria immediately, as many providers choose to implement EMRs gradually, over an extended period of months or years.⁴ In this case, the providers would not receive any compensation until all of the standards for “meaningful use” are met. Consequently, many physicians and healthcare providers are forced to find other ways to offset some of the additional costs of EMR implementation, which can often mean direct consequences for the physician and for the patient-physician relationship.

Healthcare providers attempt to offset the costs of EMR adoption as much as possible, and often these attempts to maintain revenues can result in compromising the quality of the patient-physician relationship. For example, learning how to use EMR software takes time, and physicians should account for this learning curve by scheduling fewer patients during the period of transition from paper records. However, doing so would result in additional financial costs from lost patient visits and procedures. As a result, many physicians are hesitant to incur these costs in addition to the expensive base cost of EMR implementation. Instead, they are pressured into shortening time with patients or working longer days in order to see the same number of patients and to

² Robert H. Miller and Ida Sim, “Physicians’ Use Of Electronic Medical Records: Barriers And Solutions,” *Health Affairs* 23, no. 2 (March 1, 2004): 116 –126.

^{3,4} Tomes, “Avoiding the Trap in the HITECH Act’s Incentive Timeframe for Implementing the EHR.”

maintain previous revenue levels as they struggle to learn how to use the new EMR system.⁴ These stubborn scheduling practices during transition result in the physician spending a smaller amount of time with each patient. This shorter patient contact time - coupled with the inherent learning curve of EMR software - has the capacity to cause the physician to neglect some needs of the patient either purposefully or accidentally.

Although the initial costs associated with EMR implementation are significant, long-term financial gains have the potential to outweigh the high initial costs. In one cost-benefit analysis, researchers projected a median five year net benefit of nearly \$86,400 per provider after the adoption of comprehensive EMR software.⁵ The estimated financial gain is a result of savings in several areas including reduced clerical costs, increased efficiency in prescribing, reduction in clinical and clerical errors, and increased efficiency in billing. These are only some of the major contributing factors that were taken into account for the aforementioned study. There are many other factors that could compound the financial gain that have not been taken into account. It is easy to see how many of these factors could help to improve patient care as well. Further, with the increase in savings from EMR adoption, physicians may be able to reduce the number of patients they see in a given day, thereby increasing the length and personal nature of each visit.

Overall, the monetary costs of EMR implementation are very favorable for strengthening the patient-physician relationship. The significant initial costs are generally recouped within a few years of use, and the financial gain thereafter is potentially very high. Many of the factors that contribute to financial savings are also positive for the patient-physician relationship. In a world where there is increasing financial strain on

⁴ Miller and Sim, "Physicians' Use Of Electronic Medical Records."

⁵ Samuel J. Wang et al., "A Cost-benefit Analysis of Electronic Medical Records in Primary Care," *The American Journal of Medicine* 114, no. 5 (April 1, 2003): 397-403.

healthcare providers, EMR technology has the potential to ease some of that financial burden. As physicians begin to realize financial gains associated with EMR use, they can be enabled to provide better care for their patients instead of worrying about the financial bottom line.

EMRs and Physician Efficiency

For physicians considering adopting a new EMR system, one of the issues of greatest concern is the impact that the EMR will have on their workflow and efficiency.⁶ Many physicians are concerned that using EMR software instead of paper records will slow them down and cause them to be less efficient.⁷ Often, these physicians are merely afraid to change when they have been successful using paper records for their entire careers previously. However, once the physician has learned to use the EMR software effectively, electronic records actually help to increase efficiency and improve quality of care.

Modern EMRs have the ability to enhance efficiency in a variety of ways. Physicians with EMR systems in place have been shown to order fewer unnecessary diagnostic tests than physicians using paper based records.⁸ A reduction in unnecessary tests ordered could result in savings of time and money for both the physician and the patient, which would increase productivity and patient satisfaction. Additionally, one survey shows that physicians using EMRs are able to provide 7.5% more total services

⁶ Mary E Morton and Susan Wiedenbeck, "A Framework for Predicting EHR Adoption Attitudes: A Physician Survey," *Perspectives in Health Information Management / AHIMA, American Health Information Management Association* 6, no. Fall (September 16, 2009).

⁷ Catherine M. DesRoches et al., "Electronic Health Records in Ambulatory Care — A National Survey of Physicians," *New England Journal of Medicine* 359, no. 1 (July 3, 2008): 50–60.

⁸ Michael F. Furukawa, "Electronic Medical Records and Efficiency and Productivity During Office Visits," *American Journal of Managed Care* 17, no. 4 (April 2011): 296–303.

and 9.9% more diagnostic and screening services per 20-minute period.⁹ With this increase in efficiency, physicians would have more time to dedicate to other facets of patient care such as relating to the patient or to educating the patient on their particular healthcare needs. Thus, the proficiency gained by the use of EMRs could certainly help to increase quality of care by strengthening the patient-physician relationship.

While the implementation of an EMR system can help greatly to increase physician efficiency, this benefit requires an initial investment in time to learn how to use the software. During this learning period, the physician will most likely experience a regression in productivity versus the paper record. Physicians who are learning a new EMR system will have to spend time customizing their visit-specific or disease-specific electronic forms. They have to redesign their workflow, both in the exam room and in clinical operations. A host of other “complementary changes” are also required to tailor the EMR to meet each healthcare provider’s specific needs.¹⁰ As discussed previously, time should be budgeted accordingly in order to account for the learning curve. Nevertheless, the physician may experience frustration during this period which may lead to questioning the value of the EMR system.

It is important for the physician to persevere through the frustrations of learning the software so that the physician can learn to utilize the full benefits of the EMR. Additionally, studies have shown that it helps if physician groups have an “EMR champion,” a physician who most strongly believes in the EMR software and who motivates the other physicians to continue to learn as well.¹¹ During this transition period, which can last for months or even years, strains on the physician time and patience have

⁹ Ibid.

¹⁰ Miller and Sim, “Physicians’ Use Of Electronic Medical Records.”

¹¹ Ibid.

the potential to harm the patient physician relationship if the physician is not dedicated to maintaining high quality care.¹² Although stresses may be placed on the physician during transition, the physician should make every effort to limit the transference of these problems to the patient so that the patient-physician relationship is not compromised.

EMRs have the capability to enhance physician efficiency greatly if the physician is willing to commit to high levels of EMR usage. The greatest benefits of EMR adoption are achieved when the physician commits to utilizing as many aspects of the software as possible, even if full adoption occurs in stages at different levels of use. In fact, limiting the implementation of EMR functionality to minimal levels can prove counterproductive in both efficiency and cost.^{13, 14} This is why the United States government has called for EMR incentives only to be given to those providers who demonstrate effective levels of “meaningful use.”¹⁵ Comprehensive adoption of EMR software which includes features such as electronic prescribing, patient portals, and full documentation provides the greatest potential to ensure a high quality care for the patient. This high quality care, coupled with the efficiency of physicians that have mastered high levels of EMR use, will relieve the physician of some of the burdens of paper records, and it will allow the physician to focus on caring for the patient and strengthening the patient-physician relationship.

Physician Communication with the Patient

¹² Ibid.

¹³ Wang et al., “A Cost-benefit Analysis of Electronic Medical Records in Primary Care.”

¹⁴ Miller and Sim, “Physicians’ Use Of Electronic Medical Records.”

¹⁵ Tomez, “Avoiding the Trap in the HITECH Act’s Incentive Timeframe for Implementing the EHR.”

One of the most basic, yet most commonly neglected areas that EMRs can have an impact, is on the communication between the physician and the patient. Both at the point of encounter and afterward, the adoption of EMRs represents a considerable change in communication versus the paper record.

The most obvious change presented by EMR implementation is the presence of a computer in the clinical examination room. The computer now demands a great deal of the physician's attention, when previously the clinical encounter consisted only of the patient and the physician, with the physician perhaps jotting a few notes on the paper record. Computers require much more focus in order to navigate the screens efficiently, choose the correct options, and type in notes. One study reported that physicians spent 23% of visit time looking at the computer screen on average, and at times that number reached as high as 40%.¹⁶ Additionally, entering data into the computer may require intermittent breaks in communication while the physician just types and clicks for a period of time. During such breaks in communication the patient may feel neglected, as if the physician is not paying attention to them. While these computer related practices could be considered harmful to the patient-physician relationship, the level and quality of their impact largely depends upon the individual communication style of the physician utilizing the EMR.

The manner in which a physician utilizes the various functions of an EMR in the examination room in addition to his interpersonal style largely determines the flow of the encounter. Some physicians enter the room and go straight to the computer so that they can begin taking notes immediately. Other physicians first greet the patient and ignore the

¹⁶ William Ventres et al., "Clinician Style and Examination Room Computers: a Video Ethnography," *Family Medicine* 37, no. 4 (April 2005): 276–281.

computer at the beginning of the visit and throughout the patient narrative, choosing to enter notes after initially speaking with the patient. Also, some physicians attempt to maintain conversation throughout the visit, even while using the computer, and others prefer to alternate periods of focused conversation and focused computer use. Some physicians like to finish the entirety of the note while in the room with the patient, and others prefer to do the majority of their documentation at a remote station outside of the examination room. The examples of different variations in use are many, so it is difficult to make any generalized claims about the effects of EMRs on physician communication with the patient.

However, there are certain patterns of usage that are most prevalent, and Schacack *et. al.* have devised a classification system to describe the three most common types of physician communication styles when using EMRs.¹⁷ The informational-ignoring style focuses on gathering details and information in a manner which is often computer driven. They are largely focused on the computer, choosing to converse while staring at the screen and seldom turning to face the patient. The second style is the controlling-managerial style. This physician chooses to alternate full attention between the patient and the computer in intervals often indicated by turning to face either the patient or the computer. The third style of communication is patient focused. Even when using the computer these physicians position themselves facing toward the patient. The interaction with the patient is more conversational, and the questions are less computer-driven. Each style has its own set of pros and cons, and the quality of the patient-physician relationship is largely determined by the physician style of EMR use during the encounter.

¹⁷ Aviv Shachak and Shmuel Reis, "The Impact of Electronic Medical Records on Patient-doctor Communication During Consultation: a Narrative Literature Review," *Journal Of Evaluation In Clinical Practice* 15, no. 4 (2009): 641–649.

Regardless of the specific style of communication, in many cases, the implementation of EMRs alters the subject matter of the physician interview with the patient from being narrative based to being more purely information driven. The content of the EMR form is based on a preformatted set of questions and information queries that prompts the physician to enter large amounts of data into the record. Several studies have found that this information driven structure of the EMR often causes physicians to focus on simply acquiring the data to fill in the appropriate fields on the computer screen rather than taking a patient history in a more conversational or narrative format.¹⁸ Shachak *et. al.* characterize the issue as follows:

“While having a positive impact on information related tasks and information exchange (the first function of the medical interview), particularly about medications, EMR had a negative impact on the second function – psychological and emotional talk, establishing rapport with patients and patient centredness.”

In an effort to make full use of the vast data collecting and storing capabilities of EMR software, physicians must be wary of turning the patient-physician encounter into a point and click, data gathering experience, rather than a relational one.

The large amounts of data contained by the EMR can also help to improve physician communication with the patient when some of that data or related information is used to help educate the patient. Sharing information in the exam room such as medication lists, previous visits notes, care plans, and online educational materials can help to empower the patient during the visit so that he or she feels incorporated into the decision making process.¹⁹ Additionally, this sharing of information can be extended to beyond the exam room by the use of remote patient access portals via the internet. Some

¹⁸ Ann S O'Malley, Genna R Cohen, and Joy M Grossman, “Electronic Medical Records and Communication with Patients and Other Clinicians: Are We Talking Less?,” *Issue Brief (Center for Studying Health System Change)*, no. 131 (April 2010): 1–4.

¹⁹ *Ibid.*

physicians fear that opening the medical record for patient access through a portal could result in undue worry and an influx of unnecessary questions from patients. However, recent studies indicate that patient portals actually have the opposite effect, by reducing questions and making the exam room time more meaningful, because the patient is educated about his or her current records.²⁰ Patient Portals will be discussed in more detail in the following chapter as they pertain more directly to the patient. When used for educational purpose in both the exam room and through patient portals, EMR software has the potential to enhance the quality of physician communication with the patient by allowing the physician to empower the patient with information concerning his or her medical condition.

²⁰ Jan Walker et al., "Inviting Patients to Read Their Doctors' Notes: Patients and Doctors Look Ahead," *Annals of Internal Medicine* 155, no. 12 (December 20, 2011): 811–819.

CHAPTER THREE

EMRs from the Patient's Perspective

When considering the impact of electronic medical records on the patient-physician relationship, one must be careful to remember the latter half of that couple. Although policy makers and healthcare providers may be the ones making decisions regarding the implementation of EMRs, it is important that the patients' interests are not forgotten in the process. In this chapter I will discuss the effects of EMRs on the patient in terms of the following areas: patient portals, security, and reducing medical errors.

Patient Empowerment via EMR Patient Portals

While the effects of EMRs on patient-physician communication within the exam room have been discussed in the previous chapter, EMRs also have the ability to revolutionize how patients communicate with their physicians outside of the clinical encounter. Increasingly, clinical EMR software is being coupled with a patient user component that enables the patient to have remote access to their health information to communicate with their healthcare provide. This software application is often referred to as the patient portal, and it can be implemented with varying degrees of functionality and access. The primary purpose of the patient portal is to improve quality of care by educating the patient about his condition and facilitating more effective patient-physician communication.

The scope of the functions that exist within any one patient portal application vary widely amongst the healthcare providers that choose to implement them. At the most simple level of implementation, patient portals can provide patients with services such as

online scheduling of appointments or links to educational materials on the internet. All of the information provided through these most basic portals is generic, and very little of it is privacy-sensitive. However, even this limited amount of additional information given to the patient outside of the clinic can help to empower the patient, and patients tend to react positively to these portal functions.¹ Online scheduling can be simpler than attempting to call the doctor's office, and patients with chronic diseases such as diabetes, which require regular care and observation, could benefit from an easier method of managing their numerous appointments. Additionally, if patients receive email reminders regarding appointments that they scheduled themselves, then patients may feel a greater degree of responsibility for their own care than if they had simply called and had a nurse schedule their appointments.²

Many of these portals contain links to educational materials that help to inform patients about their conditions. This is particularly helpful, as many patients are unhappy with the amount of information they are able to receive during their limited time with the doctor.³ If patients feel uncertain about what their doctor has told them during their appointment, they can have the confidence of knowing that they will have a reliable source of information from which they can learn more at home. Additionally, doctors would not have to worry about potentially inaccurate patient self education that could result from unregulated internet searches. In this way, the patient becomes better educated about his condition so that he may become a partner in his own care, rather than simply a recipient of services from the healthcare provider. Also, more educated patients

¹ Susan L. Zickmund et al., "Interest in the Use of Computerized Patient Portals: Role of the Provider–Patient Relationship," *Journal of General Internal Medicine* 23 (December 19, 2007): 20–26.

² Tejal K. Gandhi et al., "Primary Care Clinician Attitudes Towards Electronic Clinical Reminders and Clinical Practice Guidelines," *AMIA Annual Symposium Proceedings* 2003 (2003): 848.

³ Zickmund et al., "Interest in the Use of Computerized Patient Portals."

can make better use of their time with their physician, because they will ask better questions and understand more of what the physician tells them during their office appointments.⁴

Some patient portals actually allow the patient to access some of his medical information in depth, by making lab results accessible through the portal. These systems can either make the lab results instantly available to both the physician and the patient, or they can delay posting results up to a week, pending physician approval to screen for any significantly abnormal results.⁵ In general, patients react positively to the capability of viewing lab results electronically, because it can be quicker and more informative than hearing results from a physician or other healthcare professional in person or over the phone. However, in one study, some patients did express that they would prefer phone notification from a person who was educated enough to answer basic questions regarding interpretation of results.⁶ So while it may be quicker to access lab results electronically, there is the potential for confusing or alarming the patient if he is unfamiliar with data contained in the results. However, this may not be a concern for patients with chronic diseases, who regularly undergo the same types of tests, such as diabetic patients. Either way, providing patients with their lab results electronically is another method of empowering patients by providing them with information that is relevant to their condition and care.

The most comprehensive and most controversial patient portals are those that allow access to the entire medical record. Patients can view everything in their record

⁴ Walker et al., "Inviting Patients to Read Their Doctors' Notes."

⁵ Shane R Reti et al., "Improving Personal Health Records for Patient-centered Care," *Journal of the American Medical Informatics Association : JAMIA* 17, no. 2 (March 2010): 192–195.

⁶ Donna M Baldwin et al., "Patient Preferences for Notification of Normal Laboratory Test Results: A Report from the ASIPS Collaborative," *BMC Family Practice* 6 (March 8, 2005): 11.

including lab results, previous procedures, and even physician notes. While a majority of healthcare providers are in favor of some of the previously mentioned levels of patient access, physicians are still very much concerned about the idea of sharing the entire medical record with the patient so easily.⁷ Currently, it is the patient's legal right to view their own medical record, but most institutions require a fee or a waiting period so as to discourage unnecessary patient access. Many physicians are worried that the ease of access proposed in the open note portals could compromise the integrity of the record by pressuring physicians to screen what they write in order not to offend or worry the patient. Physicians are particularly worried about having open notes when dealing with conditions of a particularly sensitive nature such as obesity or end of life care. Although this level of implementation has been limited thus far, in settings where it has been introduced, both physicians and patients have responded positively.⁸ Patients reported feeling more at ease with their quality of care, and physicians noted that visits were more efficient as a result of the patient being better prepared. Full open-note patient portals represent a major shift in power from the current model of the patient-physician relationship, and it may take some time for this shift to be widely accepted by the patient and the physician.

From basic scheduling functions to full open-note access, patient portals are a valuable tool for empowering the patient and enhancing the patient-physician relationship.^{9,10,11} Patients feel more responsible for their own care as they gain more

⁷ Walker et al., "Inviting Patients to Read Their Doctors' Notes."

⁸ Ibid.

⁹ Baldwin et al., "Patient Preferences for Notification of Normal Laboratory Test Results."

¹⁰ Ibid.

¹¹ Shane R Reti et al., "Improving Personal Health Records for Patient-centered Care," *Journal of the American Medical Informatics Association : JAMIA* 17, no. 2 (March 2010): 192–195.

information about their conditions and treatments. Physicians notice that better informed patients can make for more meaningful visit time. However, these technologies have still not been widely implemented, and both physicians and patients have some concerns regarding their use.

Security of EMRs and Patient Portals

One of the most prevalent concerns among patients when considering the use of EMRs and patient portals is about the security of these new electronic systems.^{12,13,14,15} As new EMRs become more widespread and increasingly networked via the internet, security and confidentiality of the information handled by the EMR software has become a greater concern than ever. The security of patient information has now shifted from being entirely controlled by the healthcare provider to a shared burden of confidentiality among the healthcare provider, the EMR software engineers, and the patients that may now have remote access to their records. Personal health records can contain some of peoples' most sensitive and private information. As such, any breach in the security of this information could have drastic consequences for the individual whose information has been compromised.

As electronic medical records have become internet compatible through networking and patient portals, patients have become more concerned about the security of their sensitive health information. Popular media stories about internet security breaches from hackers, viruses, and other sources have made many patients uneasy about

¹² Miller and Sim, "Physicians' Use Of Electronic Medical Records."

¹³ Baldwin et al., "Patient Preferences for Notification of Normal Laboratory Test Results."

¹⁴ Anne M. Fulton-Cavett, "THE EXPANDING USE OF Electronic Health Records," *Brief* 40, no. 4 (Summer 2011): 46–54.

¹⁵ Berner, Detmer, and Simborg, "Will the Wave Finally Break?".

the potential vulnerability of their medical records to these same problems.¹⁶ New EMR systems are being designed with the most rigorous security standards in mind, but it is nearly impossible to prevent every possible type of security breach. For example, most patient portals that allow for doctor-patient communication over the internet use customized messaging systems that have more advanced built in security measures than those of regular email. Additionally, physician access of records is always password encrypted at multiple levels to ensure that only approved users have access. The Institute of Medicine recently released a report entitled, *Health IT and Patient Safety: Building Safer Systems for Better Care*, in which they examined the current status of EMR systems.¹⁷ In the report, they recognized the need for additional oversight of healthcare IT systems by recommending that the FDA act as a regulating agency for EMRs. Such oversight of the currently widely unregulated industry would certainly prove helpful for establishing privacy and security standards for all EMR systems and for alleviating public concerns about security.

When considering the security of their electronic records, patients must now also realize that they have a larger role than ever before. Both directly and indirectly patients are more responsible than ever for helping to ensure the privacy of their records. When accessing their medical information through patient portals, patients must be vigilant to keep their user information secure so that others cannot log on to their account. Additionally, patients accessing their records should only access these portals on their own private computers and never on public computers or public internet connections. Patient portals do pose a potentially large security risk, however a significant portion of

¹⁶ "Vets' Personal Data Stolen," *Wired*, May 22, 2006.

¹⁷ "Health IT and Patient Safety: Building Safer Systems for Better Care", n.d., http://www.nap.edu/openbook.php?record_id=13269&page=7.

that risk is directly in the hands of the patient by practicing safe methods of accessing that information. Indirectly, patients need to be aware that even giving out information such as their primary care providers name could provide the means for a security breach if the records are stored electronically. Information is power for both the patient and potentially malicious parties, and the patient now bears a greater responsibility for ensuring that his or her health information remains private and secure.

The security and privacy of patient EMRs is an important issue that must be addressed, because patient trust in the EMR system is so closely tied to their trust of the physician and the quality of the patient-physician relationship. The concerns of patients about security, whether legitimate or not, need to be answered so that patients can fully embrace the move to full EMR implementation. If this most basic concern about the security of their information is left unanswered, then it will be difficult if not impossible for EMR implementation to have the desired widespread positive impact upon the patient-physician relationship.

Reducing Medical Errors

In 1999 the Institute of Medicine released a landmark report, *To Err is Human: Building a Safer Health System*, examining the prevalence and impact of medical errors.¹⁸ From adverse drug interactions to surgical errors, this report identified the sources of many errors and called for serious changes to be implemented to reduce these unnecessary medical errors. The Institute of Medicine followed up with another report in 2001, *Crossing the Quality Chasm: A New Health System for the 21st Century*, outlining

¹⁸ Committee on Quality of Health Care in America and Institute of Medicine, *To Err Is Human: Building a Safer Health System*, ed. Linda T Kohn, Janet M Corrigan, and Molla S Donaldson (The National Academies Press, 2000), http://www.nap.edu/openbook.php?record_id=9728.

some specific strategies for redesigning the healthcare system to reduce medical errors and improve overall quality of care.¹⁹ In both of these reports, the Committee, emphasized the important role that EMRs will play in helping to create a healthcare system with fewer medical errors and a higher quality of care. Indeed, EMRs have shown the ability to reduce medical errors, and in doing so, they have the potential to increase the quality of care and improve the patient-physician relationship.

One powerful tool that has been developed to work within the scope of EMR software is clinical decision support (CDS) systems. These systems are designed to aid clinicians in making decisions regarding the care of patients including diagnoses, treatment plans, and medication choices. Although these systems can encompass a wide variety of functions, Dr. Robert Hayward of the University of Alberta has devised a common definition: “Clinical Decision Support systems link health observations with health knowledge to influence health choices by clinicians for improved health care.” Clinical decision support systems attempt to utilize the vast stores of information provided by EMRs in order to provide the best and most personalized care for any one individual. Dr. Hayward describes this goal when he says, “Information alone does not change practice; good decisions about information change practice.”²⁰ Thus, in order for EMRs to bring about the greatest increase in quality of patient care, development and utilization of clinical decision support systems will be critical.

There is significant evidence to suggest that these clinical decision support systems do help to increase quality of care. In one systematic review done by Garg *et al.*,

¹⁹ Committee on Quality of Health Care in America, Institute of Medicine, *Crossing the Quality Chasm*.

²⁰ Robert Hayward, “Clinical Decision Support Tools: Do They Support Clinicians?,” *Future Practice* (2004), http://www.cma.ca/index.php/ci_id/40101/la_id/1.htm.

100 clinical trials involving clinical decision support systems were analyzed.²¹ The clinical decision support system showed improvement of practitioner performance in 64% of the trials. Additionally, 13% of the trials showed improved patient outcomes. Another study performed by Kawamoto *et al.* showed similar results.²² In their analysis of 70 trials with practitioners utilizing clinical decision support systems, 68% showed a significant improvement in clinical practice. Clinical decision support systems represent a great asset towards eliminating medical errors and improving quality of care. However, with the wide variety of available features and functions, more research is needed to determine exactly which style of CDS system provides the most benefit in terms of quality of care.

One specific type of clinical decision support system that is relatively simple and effective is computerized practitioner order entry (CPOE). This software application allows practitioners to order tests and medications electronically. Also, it automatically alerts the provider if any of the tests or medications have potentially harmful effects or interactions that may have been overlooked for that specific patient. One study examining the effectiveness of these CPOE systems found that alerts generated by CPOE software altered provider ordering behavior 41.75% of the time that alerts were generated, and approximately 25% of those alterations caused the cancellation of a potentially unsafe order.²³ These altered provider behaviors represent many potentially harmful mistakes

²¹ Amit X Garg et al., "Effects of Computerized Clinical Decision Support Systems on Practitioner Performance and Patient Outcomes A Systematic Review," *JAMA: The Journal of the American Medical Association* 293, no. 10 (March 9, 2005): 1223–1238.

²² Kensaku Kawamoto et al., "Improving Clinical Practice Using Clinical Decision Support Systems: a Systematic Review of Trials to Identify Features Critical to Success," *BMJ : British Medical Journal* 330, no. 7494 (April 2, 2005): 765.

²³ Kshitij Saxena, Barry R. Lung, and Jody R. Becker, "Improving Patient Safety by Modifying Provider Ordering Behavior Using Alerts (CDSS) in CPOE System," *AMIA Annual Symposium Proceedings* 2011 (2011): 1207–1216.

that were corrected as a result of the CPOE alert system. While this system only screens for relatively basic contraindications, these are just the sort of errors that are detailed enough to be overlooked by the provider yet potentially harmful enough to result in a serious medical error if not corrected. Widespread CPOE use as a part of a comprehensive EMR system could help significantly to reduce the number of medical errors that result from incorrect orders for medications and tests. Recently, congress recognized this potential when they included CPOE capability as an essential function under the definition of “meaningful use” in the previously discussed HITECH act of 2009.²⁴

Computerized provider order entry is just one example of a clinical decision support system that could help to reduce medical errors and improve quality of care. There have been many other instantiations of CDS systems that, when incorporated into a comprehensive EMR system, have the potential to improve quality of care in a similar manner. Electronic prescribing of medications in the outpatient setting can help to ensure better communication between the physician and the pharmacist, while streamlining the entire prescribing process. Some CDS systems have been developed that help providers analyze diagnostic results by alerting the providers of critical values or giving suggestions for potential diagnoses.²⁵ Other CDS systems are simply programs that easily link specific patient treatments or diagnoses to online information in journals or textbooks.

Additionally, different systems utilize various methods to alert providers. Alerts can be presented in such a way that they require a provider to interact with it to either

²⁴ Tomes, “Avoiding the Trap in the HITECH Act’s Incentive Timeframe for Implementing the EHR.”

²⁵ Garg et al., “Effects of Computerized Clinical Decision Support Systems on Practitioner Performance and Patient Outcomes A Systematic Review.”

dismiss or activate it. Some alerts even require the provider to make a notation explaining their decision to dismiss the alert if they choose to do so. Another method of showing information from the CDS system is to build it in to the fields on screen, so that providers can still view it without being obligated to interact with the alert and potentially disrupt their workflow. Studies have shown that alerts that require active participation from the provider are the most effective at modifying physician behavior.²⁶ Given the extensive number of potential applications for CDS and the variety of implementation styles, it would certainly be worthwhile to conduct more research to determine which methods of CDS use and design prove most effective at increasing overall quality of care.

²⁶ Kawamoto et al., "Improving Clinical Practice Using Clinical Decision Support Systems."

CHAPTER FOUR

Conclusion

The widespread implementation of electronic medical records software in the United States healthcare system has the potential to drastically alter the nature of the patient-physician relationship. Both patients and healthcare providers alike have begun to face new challenges in this age of electronic medicine, and they have also begun to reap great benefits from the advancements in health information technology. The scope and magnitude of EMR use will only increase, as government legislation calls for increased EMR use by all healthcare providers. In order to ensure the most positive outcomes, both healthcare providers and patients must be aware of the most important issues at hand when utilizing an EMR system.

In the previous chapters I have discussed some of the most significant issues concerning EMR adoption versus paper record use. Specifically, I outlined the effects of those issues on the patient-physician relationship and quality of care. This analysis was performed from the perspective of the healthcare provider and from the perspective of the patient. Figures 4.1 and 4.2 below provide a visual summary of the primary advantages and disadvantages of EMRs versus paper records as stated in the previous chapters. Figure 4.1 corresponds to the healthcare provider's perspective, and figure 4.2 corresponds to the patient's perspective.

Figure 4.1: Advantages and Disadvantages of EMRs vs. Paper Records - Healthcare Provider's Perspective

	Advantages	Disadvantages
Paper Records	<p><u>Cost</u> -small up-front costs</p> <p><u>Efficiency</u> -quick and easy -familiar workflow</p> <p><u>Communication</u> -more freely flowing patient interview -more eye contact -closed patient record</p>	<p><u>Cost</u> -larger long-term clerical costs -greater potential for billing errors -HITECH act reimbursement cuts in 2015</p> <p><u>Efficiency</u> -must have physical record to work -higher probability of losing record -less productivity</p> <p><u>Communication</u> -may miss important data points</p>
EMRs	<p><u>Cost</u> -"meaningful use" incentives -save money in clerical costs over time -more accurate billing</p> <p><u>Efficiency</u> -remote access to modify record -much lower risk of loss/destruction -increased productivity</p> <p><u>Communication</u> -reminder to gather important data -depends on communication style -patient portal and education</p>	<p><u>Cost</u> -high up-front costs</p> <p><u>Efficiency</u> -learning period for new system/workflow</p> <p><u>Communication</u> -encourages "point and click" interview style -less eye contact -less patient-centered narrative</p>

Figure 4.2: Advantages and Disadvantages of EMRs vs. Paper Records - Patient's Perspective

	Advantages	Disadvantages
Paper Records	<p><u>Patient Portals</u> -no portals, so no confusion from physician lingo</p> <p><u>Security</u> -very secure -only one copy exists</p> <p><u>Reducing Medical Errors</u> none</p>	<p><u>Patient Portals</u> -very difficult to access record -less physician transparency</p> <p><u>Security</u> -less in office security</p> <p><u>Reducing Medical Errors</u> -more errors -less oversight of care decisions -less information available to physician</p>
EMRs	<p><u>Patient Portals</u> -easy access to provider and health info -better patient education -less time wasted in the office</p> <p><u>Security</u> -password encrypted -no physical record exists</p> <p><u>Reducing Medical Errors</u> -fewer errors -alerts for harmful orders -better quality of care</p>	<p><u>Patient Portals</u> -may confuse patient - problem w/ sensitive topics</p> <p><u>Security</u> -internet access to sensitive info -electronic record can be accessed anywhere -patient also responsible for security</p> <p><u>Reducing Medical Errors</u> none</p>

While both paper records and EMRs present their own unique set of pros and cons, based upon the this review and analysis, the advantages for EMRs appear to outweigh the advantages of paper records. Paper records can still provide some benefits that EMRs cannot, but as EMR systems continue to improve, EMRs should begin to dominate this debate even further. Additionally, the disadvantages for paper records outnumbered the disadvantages of EMRs. For both patients and providers, EMRs can provide great benefits in terms of the patient-physician relationship and quality of care. In its current state, the US healthcare system is enjoying many of the benefits provided by

EMR systems. However, in order to reap the fullest benefits, some fundamental changes in the healthcare system must be made to accommodate this fundamental shift.

The widespread implementation of EMRs has been a long time coming, and it appears that increased technology, government legislation, and positive attitudes from physicians and patients are encouraging signs of change which have contributed to EMR use at levels higher than ever before. Such a dramatic shift from paper records to EMRs will not be without its growing pains, however. Providers and patients will both experience frustrations as all parties adjust to the EMR learning curve. This learning period will most likely last for several years from the beginning of EMR implementation, and it could last even longer, as the HITECH act of 2009 continues to pressure healthcare providers nationwide to switch to using EMRs. Make no mistake about it, the transition to EMRs from paper records represents a paradigm shift for the way that modern medicine is conducted, however the overall effects will prove to benefit the providers and the patients.

If the United States healthcare system is to significantly benefit from EMR use, however, all healthcare providers and patients alike must make a commitment to comprehensive EMR implementation. EMRs have the most positive effect on the patient-physician relationship and quality of care when the EMR system is used at a high level of functionality. In fact, low levels of EMR use coupled with partial paper record use could actually harm the patient-physician relationship, because such a system would be fragmented and inefficient. “Meaningful use” standards should continue to guide healthcare providers as they implement their EMRs, because EMR systems that fall short of those standards fail to benefit providers and patients in the fullest way. Additionally,

these standards should be revisited every few years to accommodate advances in technology and design. Hopefully, the term “meaningful use” will eventually be phased out, as the “meaningful use” standards gradually become expected as the industry minimum.

As the healthcare industry transitions to electronic records, care should be taken to ensure that the physicians that will be utilizing these EMRs have adequate training. In medical schools across the country, future physicians should be informed about the advantages and possible pitfalls of using EMRs. Some attempts have already been taken to create models for teaching proper EMR protocol, however, more steps should be taken to adequately prepare future professionals to embrace EMR platforms.¹ From proper documentation techniques to exam room communication, medical students should be taught how to make an EMR system an ally in care rather than an obstacle. Training should incorporate EMRs seamlessly, such that new physicians are able to fully utilize the EMR systems in place when they begin practicing medicine. Emphasis on training future physicians to use EMR systems is absolutely critical if we are to hope to move medicine into the electronic age.

The incredible potential for EMRs to revolutionize the healthcare industry has been discussed in detail in the previous three chapters. Some of the tools provided by EMRs include patient portals, computerized physician order entry, clinical decision support systems, communication between providers, and a virtual health record. However, all of these tools carry with them a sobering responsibility on the part of providers and patients. We must all take care to ensure that humanity and empathy

¹ Mark B. Stephens, Ronald W. Gimbel, and Louis Pangaro, “Commentary: The RIME/EMR Scheme: An Educational Approach to Clinical Documentation in Electronic Medical Records,” *Academic Medicine* 86 (January 2011): 11–14.

remain integral to patient care. No software or electronic tool can mimic the genuine compassion and trust that has come to define the patient-physician relationship. The inherent danger of this new technology, of course, is to let the technology define the nature of the patient-physician relationship by abstracting the medicine away from the human component. If we are vigilant to guard against the loss of compassion as we make great strides in efficiency and data collection, then EMRs can certainly prove to be an invaluable asset in the ongoing fight against suffering and disease.

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