eMESSAGING AND THE PHYSICIAN/ PATIENT DYNAMIC

Practices in Transition

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Elements of Change

The destabilizing nature of change induces both a reaction and a response from those experiencing it. People typically *react* to change by attempting to minimize its potential disruption of day-to-day events, since it can often provoke discomfort, anxiety, or even fear. Reactions involve either accepting or rejecting what is new in an attempt to return as quickly as possible to a felt state of equilibrium or perceived normalcy. For instance, if something different is introduced into the environment such as a unique product on the market or a technological invention, the immediate reaction is either to ignore the item or to experiment with it to see if it might fit into normal, everyday life as naturally and efficiently as possible. Both favorable and unfavorable reactions perpetuate the daily ebb and flow of new events that are introduced into society on a steady, ongoing basis.

Collective group reactions occur among like-minded individuals. As these patterns are recognized and acknowledged (often through the help of public and social media), this affects how well and how quickly the change filters through society. How many people are affected by these reactions often influences to what extent and in what manner the public then *responds* to the overall change. To understand such a collective response, a historical perspective is needed to determine the climate and situation that existed as change was introduced. At times, when looking back, the process seems rather abrupt. Many have referred to these collective responses as a “take off moment” (McLuhan M., 1962, p. 79) or “tipping point” (Gladwell, 2002) as if a precise moment in time might identify the very instance of change. Retrospectively, transitions may appear to be sudden or reactive, but those that affect the intricate system of a sociocultural environment occur as multiple, interlocking patterns of responses that pass through time and space to warrant recognition as true *periods*—not mere moments or points—of change.

Responses require interactive, participatory, thoughtful engagement. People ponder the ramifications of how the overall structure and nature of the environment might be altered as a result of the individual and collective reactions that first surface. Responses, though often characterized by varied levels of emotion, evolve through a process of logical reasoning and reflection. They tend to be less spontaneous and more conscious and purposeful than mere reactions to change. They often occur after considering multiple views and counter-opinions and tend to be more consistent with personal goals, beliefs, and values.

Applied adaption to something introduced to the public—particularly that which affects our most basic methods of communication—requires testing, challenging, retesting, and then, if desired, fully integrating the change into the sociocultural fabric of the environment. When this transition elicits reflective thought and reaction by multiple groups in society, it can affect all aspects of that environment to the point where a significant, more consequential, and far-reaching transformation may occur. The whole is constantly affected by its composite parts. Each subgroup uniquely and collectively responds to the mechanism of change, while simultaneously modifying and sustaining the dynamic "organismic whole" of society.[1] This transformative process, made up of a multitude of reactions and responses from those living within this environment, evolves into a pattern of interconnected and interdependent working parts within this dynamic, adaptive space. Relatively new media of communication such as the telegraph, telephone, and television bring about particularly influential, lasting, and transformative effects on society in general and on specific spaces within society in particular—in this case, the medical arena.

Studying such a process not only allows for a deeper understanding of how something new is *introduced* into the sociocultural fabric of an environment but also enables us to learn about the long-term effect of this process from multiple perspectives and within a variety of contexts over time. How roles are redefined, relationships developed, laws generated, policies upheld, economies challenged, public reactions and responses predicted, and so on affect how change is implemented, managed, integrated, and sustained within the sociocultural context of a given environment. Predicting behavior, anticipating problems, planning for future outcomes, and testing the change through research may jointly be facilitated by studying this process.

More specifically, when a change involves something as fundamental to human existence as communication about health, exploring the introduction to, transition through, and implementation of such a change is vitally important to understanding its effects on the multiple groups of people within the entire environment. In fact, as Thomas Kuhn once stated, "Any study of paradigm-directed or of paradigm-shattering research must begin by locating the responsible group or groups" (*The Structure of Scientific Revolutions*, p. 179). Despite his use of the term "shattering," however, Kuhn recognizes that for something to be paradigmatic, it "need not be a large change, nor need it seem revolutionary to those outside a single community," and, yet, no matter how large or small, "change so badly needs to be understood" (p. 180). This book examines the process of how one seemingly minor change—communicating online between physicians and patients within secured Electronic Health Record (EHR) portals—shifted the very essence of the medical relationship and healthcare in general.

INTRODUCING CHANGE IN THE HEALTHCARE INDUSTRY: MEDICAL SCIENCE AND TECHNOLOGY

Change itself is a constant in the healthcare arena. Toward the end of President Barack Obama's first term in office, the healthcare setting reflected tremendous growth and development. The Bureau of Labor Statistics (2013) projected a 2.6% increase in the healthcare and social assistance sectors alone, stating that five million jobs were expected to be added to the U.S. economy between 2012 and 2022. Of these jobs, telehealth services by 2014 produced an industry revenue of $585 million with projected revenue growth of 49.5% through the end of 2015, making telehealth services the second fastest-growing industry in the United States at this time (Winfrey, 2015). The year 2015 was declared "The Year of Healthcare" for Wearables (Feibus, 2015), in reference not only to wristbands or ankle bands that monitored movement and exercise but to healthcare devices that monitored everything from blood glucose levels to blood pressure.[2] An example of one of these cutting-edged wearables was Vida®, a phone app that paired the wearer with his or her own personal "coach" (real or android) that helped monitor daily activities and provided assistance in the form of personal training, nutrition plans, mentoring, therapy, accountability partnering, and the like. Each health coach was designed for the wearer's specific motivational needs with personality options of cheerleader, drill sergeant, innovator, listener, challenger, or analyzer. This coach was available 24 hours a day, 365 days a year.[3] With similar innovative devices coming out on a regular basis, it was projected that the annual smart wearable healthcare market volume would increase from $2 billion in 2014 to $41 billion in 2020, reflecting a compound annual growth rate of 65% (Soreon Research, 2014).

Likewise, in the medical science sector, discussion of health advancements continued with much of the development focused on health technology innovations. For instance, Cleveland Clinic's HealthHub reported on the top ten medical innovations of 2015 that were set to "reshape care." These included mobile stroke units with broadband video links (onboard paramedic units), the Dengue fever vaccine, painless blood-testing from the fingertip, and leadless cardiac pacemakers (wireless cardiac pacemakers inserted without surgery) (Cleveland Clinic, 2014).

Combined technology and medical science daily produced such remarkable advancements as 2015's first pill made by 3-D printing and approved by the FDA.[4] This technology served as a prototype for future "custom-ordered" pills that no doubt were hoped to eventually address individual patient health concerns as the need arose (Preidt, 2015). On a regular basis, such innovations combining technology and science brought change to the medical arena and in turn caused those who needed medical intervention to be touched very personally by these remarkable discoveries. From the perspective of the general public and medical professionals alike, these changes were generally welcomed. They were reacted to with curiosity and interest and responded to with a cautious willingness of adoption so long as they improved quality of life and overall health—the goal of research, development, and care within the healthcare profession.

CONVERGING INFLUENCES: MEDICAL COMMUNICATION, TECHNOLOGY, AND GOVERNMENT

The complementing roles of medical science and medical technology have remained significant in the pursuit of health; however, these did not in any way diminish the equally important role of medical *communication* in the effective care of the patient (Polack & Avtgis, 2011).[5] More than ever before, communication emerged as a key component in medical education (Livni, 2015; Association of American Medical Colleges, 2015),[6] government policy (U.S. House of Representatives, 2013), and practice application opportunities (Abdelhak & Hanken, 2016). Over time, the study of medical communication affected how patients were taught to participate in their own care; how decisions were made concerning best procedures and treatments for improving outcomes; how teams of health professionals interacted to work together in making remarkable discoveries and maintaining basic patient care; and how the patients and professionals alike engaged within the system to gain, apply, and share the knowledge and skills necessary to maintain health in an effective, satisfying manner. This was (and still is) the goal of the healthcare system.

The space within which this medical communication process flourishes is the "medicological environment,"[7] a term coined herein to describe a conceptual space characterized by an ever-changing system of converging influences involving medical health issues. In this space, depending upon the severity and the personal involvement of the healthcare issue, most, if not all, groups within society find themselves reacting and responding to the combined contributions of medical science, technology, and communication. At times, the reaction has been a dismissive one, as when a health issue or breakthrough did not immediately concern an individual (e.g., the Dengue fever vaccine). At other times, the change directly affects most peoples' lives as it did with the introduction of the Affordable Care Act of 2010, which was designed to provide all American citizens the right to health insurance coverage no matter the income level or preexisting condition.[8] The public, whether they are cognizant of it or not, is inherently affected by the changes that occur within the medicological environment since, theoretically, everyone in society interacts with the system at some point or other. Health exists as a common human denominator and consequently a common area of concern.

At times, however, even though healthcare issues impact the general public, people seem to react with selective inattention when the change does not affect them personally. One such influence within the healthcare industry was the introduction of the EHR.[9] Unless patients noticed the rows of physical charts missing in the physician's check-in area or reacted to the intrusive presence of a computer laptop during a physical examination, few appreciated the relevance of this innovation in healthcare during this time of transition. However, as this technology became more deeply integrated into the day-to-day practice of medicine by hospitals, physicians, healthcare workers, and patients alike, the EHRs' effect became more noticed.

To understand the context within which EHRs were implemented, it is important to note what was going on in society at the time of their introduction into the healthcare industry. In the late fall of 2008, the Economic Stimulus Act of 2008 (110th Congress) was passed by the Obama Administration. It drew public attention because it had to do with recovery rebates to individual citizens, incentives for business investments, and an increase in Federal Housing Authority loan limits. Those eligible for financial gain paid attention. Later, the American Recovery and Reinvestment Act (ARRA) of 2009 (111th Congress) was approved with $787 billion of government money promised as a stimulus to the economy. This act was less about incentives and rebates and more about preserving and creating jobs, offering assistance to the unemployed and enhancing energy efficiency. It was no wonder that an act having to do with jobs and money would garner such attention from the American public.

By contrast, a portion of the ARRA was designated specifically for healthcare and information technology. Referred to as the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 (111th Congress), it promised $19 billion of the total available $787 billion to be used for health technology, namely for the implementation of EHRs. For the general public, few concerned themselves with this act unless, of course, they were in the health sector, and, even so, only hospitals and individual physicians who were directly eligible for the incentive payments paid much attention.[10] In short, the entire process of EHR adoption motivated by the HITECH Act went on in the background while other aspects of the ARRA held the attention of the public. Meanwhile, quietly and systematically, a new form of communication began to materialize within the boundaries of EHR systems: the electronic medical message. This medium within a medium initiated a tremendous transformation in how patients and physicians alike communicated about health.[11]

EXPLORING THE PROCESS: ELECTRONIC MESSAGING WITHIN THE SECURED PORTALS OF EHRS

Despite the initial inattention, change was certainly taking place, and that change was destined to affect not only healthcare workers but all those who used the healthcare system—virtually everyone. Various users of this new health technology responded not only to the electronic record-keeping but to the more transformative process of communicating electronically *within* the new technological medium of secured portals of EHR systems.

In order to explore the complexities of this process, each of the remaining four chapters examine the intricate, interlocking patterns that emerge throughout this transition. Finally, chapter 6 reflects not only on additional systemic nuances but also on the continuing, future changes that promised to unfold.

CHAPTER 2 OVERVIEW: MEDIA AND POLICIES

Chapter 2 begins by looking at the various governmental policies that rather forcibly and abruptly thrust the healthcare system into the adoption of EHR technology by mandating that it be used not only for record-keeping but as a means of online communication about health. Three specific perspectives are taken in exploring how policies were developed to enforce this transition: physicians, patients, and media. That is, this chapter explores policies affecting how physicians had to implement EHRs within their practices, how the patients were gradually taught to use this medium as a means for communicating, and how the overall technological landscape and infrastructure prepared for this new medium through social, economic, and telecommunications regulations.

This segment reviews in detail the specific policies mentioned above and how they were responded to over time by the physicians, the hospitals, the patients, and even the variously affected outside organizations (such as health insurance companies). Each group adhered to the laws according to how they influenced their personal roles and professional obligations. Each reacted with cautious curiosity as EHRs became more user-friendly and familiar to them. Each responded more thoughtfully as the full appreciation of the new technology affected more and more aspects of their health and personal lives.

For the health professionals, EHRs largely created an economic concern about their ability to meet the financial demands of purchasing new equipment, training their personnel (and themselves), and teaching patients how to become more responsible for participating in their own health. After all, if they did not follow government mandates, they would be financially penalized and eventually forced to retire, downsize, or leave their practices altogether.[12] Most importantly, however, this conversion process was a moral and ethical obligation as they were told that EHRs would improve their patients' satisfaction and overall health. Challenged with wanting to adhere to regulations in healthcare and, above all, wanting to provide the best possible care for their patients, the physicians adopted EHRs into their practices at varying rates and levels of commitment. But most adopted with conviction to do what was said to be medically best for their patients.

For the patients, this technology eventually came to mean a mechanism for getting their records in electronic form to be transferred from one physicians' office or hospital to the next so that care could be continuous. Records were made available on compact disc, on flash drive, or, eventually, through the Internet allowing the sharing of information with patients for personal, physician-transfer, or travel purposes. This is what public media was selling to those who were listening, and to those who were not listening to this news, the physicians began offering the option directly to their patients in order that they could prove that they really were carrying out the mandates imposed by the new laws. That is, the physicians were "selling" the change so that they could show that patients were adapting to it and accepting it as part of their health experience. Without evidence, they would not get reimbursements from the government. Patients had to use the medium to supply usage data, proving that EHRs had not only been purchased but that they were actively implemented and applied to the practice of medicine.

Eventually, patients started to look directly at EHR information online in their own electronic chart to see what was written about themselves by their physicians,[13] what the results from tests might be (perhaps even before the physicians' office called to let them know the results),[14] or even simply when their next appointment was scheduled. As EHRs became more common place in physicians' offices and hospitals alike, other features besides secured patient health information (PHI) storage became introduced first to the physicians and then to their patients. Now EHRs also provided a means for exchanging "emails" or electronic messages within a secured space. This meant that patients could reach their physicians at any time, night or day, through electronic messages sent through EHR portals that allowed for direct, continuous contact for follow-up questions, clarifications, or comments. Health Insurance Portability Accountability Act (HIPAA) regulated communication within EHRs and began to transform the very ways in which medical histories were obtained, office visits conducted, information transferred, and, most interestingly, relationships developed online through a new medium of communication with the physician. This made the EHR not only a storage device for recorded communication but a transmission device for ongoing, spontaneous, interactive communication as well. This marked a significant change in how physicians and patients communicated about health.

Ultimately, the stated goal of EHRs began to become a reality as the users began to incorporate this new medium at various levels into their lives to provide improved health outcomes through shared patient/physician access to all medical records,[15] online access to health education and training, and, ultimately, shared decision-making between patients and all involved healthcare professionals.[16] Patients and physicians reacted both positively and negatively to the changes brought about by the introduction of this medium. Even though by 1996, roughly forty-five million people used emails around the globe,[17] it was not until the introduction of the HITECH Act of 2009, which required physicians and hospitals to convert to EHRs, that the means for secure electronic health message exchange was available to the general public.

By 2011, only 48% of American physicians said that they communicated with their patients online—evidence of the fact that the change was slow in coming (QuantiaMD, 2011). Patients and physicians alike continued to react to this process throughout the adoption process. Some pushed to adopt this method readily and even before government mandates required this transition. Others resisted adamantly, refusing to communicate online, and, in the case of physicians, even opting to retire rather than convert all office and hospital transactions into an EHR system. Change was introduced through the policies and government mandates at this time. As more and more physicians and hospital systems converted, more patients realized the benefits to their own healthcare, and laws and regulations continued to shove this conversion process forward.

Finally, beyond the practical aspect of policy implementation and adoption, chapter 2 examines the medium itself from a perspective rooted in the scholarship of Marshall McLuhan. In short, the EHR is a medium or channel of communication through which information about health is produced, transmitted, and stored. At the same time, more than one medium exists. There is the medium of the Internet which allows the medical information to be transmitted, the medium of the physical or “cloud” server which allows the information to be stored, the medium of the EHR program (software) which allows the information to be organized and retrieved, the physical medium of the computer which enables information to be encoded and decoded, the electronic message medium which allows people to exchange information, and so on. Each medium takes on a form of its own, a "sense ratio" as McLuhan would call it (McLuhan M., *Understanding Media: The Extensions of Man*, 1994). Each medium reorganizes the information and the experience of communicating about that information in a manner that is unique to each user. Each user experiences each medium differently depending upon how he or she perceives, engages with, organizes, explains, and uses the patterns of information contained within this space. The "perspective," therefore, of the physician and patient is unique yet dynamically whole for each person who enters that "space" and experiences this new form of technology.

CHAPTER 3 OVERVIEW: THE MEDICOLOGICAL ENVIRONMENT

Chapter 3 further introduces the concept of the medicological environment. Without apparent boundaries or limitations, this dynamic space is composed of a "mosaic of simultaneous items," that create a sort of "electricity that offers a means of getting in touch with every facet of being at once, like the brain itself" (McLuhan M., 1994, p. 249). This space acts as a "unified field without segments" (p. 247) that is affected by multiple influences from subgroups responding to changes introduced within the system, in this case by EHRs and electronic medical messaging. Age, gender, socioeconomic status, education level, location (rural/urban), and occupation are all included in the demographic variables that affect how people within this space respond to healthcare change. The "electricity" of the new EHR medium seems to send reactive shocks throughout the healthcare arena and forces those engaged with it to respond. The energy is ever-present within the day-to-day interactions of physicians and patients both within and outside the patient examination room. With the power of the Internet, this medium allows for constant change, constant use, and constant adaption to the new responsibilities shared by those who implement and use it.

Over time, newer guidelines within the healthcare industry emerged, addressing the policy changes outlined in chapter 2; and the response was felt throughout the entire medical community—by physicians and patients alike. The old paternal system represented by the physician hierarchical structure was challenged for the first time as the roles it relied upon became blurred. Patients began to come prepared to the medical interview with questions, articles, and precharted information while physicians began to respond more as teachers, facilitators, and learners than authority figures. The effect of a changing environment brought on by the introduction and acceptance of EHRs and electronic messaging has altered the status, goals, roles, responsibilities, and assumptions of the original physician/patient dyad.

This medicological environment is a sort of testing ground with many disciplines forcing their authority and influence upon it. Once preserved by the standards of medical care, the comfortable familiarity of the physician's visit was being replaced by a computer screen in the waiting area, the patient room, and the check-out counter. The physician even began to go home with the patient; for, instead of making house calls, the Internet afforded physicians constant contact, day and night, every day of the year. Patients learned quickly and adapted readily. The medicological environment is characterized by a wealth of interrelated influences including but not limited to the legal, governmental, political, environmental, technological, economic, and sociocultural ones. This chapter examines the effects of all these influences in an effort to understand how the medium of electronic messaging within EHRs had systematically altered the way communication occurred across the healthcare profession. Change became an expected function of an evolving new way of servicing the population by striving toward best health practices in a dynamic space.

CHAPTERS 4 THROUGH 6 OVERVIEW: APPLICATIONS AND RESEARCH

Considering how many divergent influences bombarded the healthcare environment, a multimethodological method of observation best brings to light the diverse perspectives in force throughout this period of transition. It is likewise necessary to hone in on the specific differences and overlaps of the rural and urban environments and to explore how the transition from paper to electronic charts affected individuals at various stages of adoption throughout this period. Methods used include both qualitative and quantitative approaches, namely oral histories, the critical incident technique, health surveys, and data mining through natural language programming and content analysis.[18] The intent is not to learn everything about the environment (as that is never possible) nor to suggest that one method is more conclusive or informative than the other. The observational methods used herein are far from exhaustive or representative of all the ways this environment could be examined. The goal simply is to reflect upon this medicological environment at the very point in time of conversion from paper to electronic charts as secured health portals went from a novelty to a shared reality. Future directions, as mentioned in chapter 6, continue to alter the face of medicine today. However, this reflective analysis is designed to capture this particular point in time in which the transition to EHRs and secured health portals began to be implemented.

The choice to compare the rural and urban environments further demonstrates how intricately the two groups loop back and forth between a diverging and a converging pattern of interrelated variables. Urban areas were already starting to adopt EHRs well before the government mandates were enforced, meaning that there was an experienced group of users that could be observed in light of their already-existing responses to the new medium. Rural areas were not so experienced nor wealthy enough to make this transition to any large extent on their own due perhaps to the lack of rural broadband, financial limitations, educational levels, media literacy, and location—to name a few. There were also a lot of forces newly at play in 2008 when President Barack Obama was being signed into office with the platform of a new healthcare law that promised to affect both the practice and the reception of medicine. The word "change" surfaced early on not only from his campaign motto but also from the mouths of the public whose cautious excitement was made evident by his election into office. Change indeed appeared to be the key word in the new HITECH Act and the force that propelled the use of this new medium forward for both the rural and the urban populations.

Chapters 4, 5, and 6 examine these differences by systematically unfolding the ways in which EHRs and electronic messaging were adopted and used by both physicians and patients within rural and urban environments during this time of transition. They afford a personal historic perspective through the voice of physicians who were beginning to experiment with the medium in their rural offices, a quantitative response analysis of both rural and urban users (patients and physicians) through survey research, and a discussion of how the messages shared within this dyad might be studied for efficaciousness in years to come.

More specifically, chapter 4 focuses on the rural environment of Johnstown, Pennsylvania, as physicians began to convert to electronic charts. A series of oral histories are offered and analyzed, beginning with a case study on a group of three physicians and their office manager who left a practice that used only paper charts and opened a new, independent one that used only electronic charts. These oral histories captured the challenges and rewards as discussed by these physicians, several of whom proudly claimed to be the "first fully electronic practice in the Johnstown region." Next, interviews with four additional primary care physicians (PCPs) are discussed, each representing different types of practices at different stages of conversion:

- From a solo practitioner to the owner of a larger group practice
- From a privately run practice to one that was owned and operated by the local hospital system
- From a practice that started EHRs well before the HITECH Act to ones that were still trying to pick out which EHR vendor (software program) to use.

Both the case study and this group of individual interviews are analyzed using a qualitative approach to elicit the "voice" of PCPs at this time of transition. Chapter 4 also includes quantitative research conducted on a larger population of regional physicians who responded to a survey about their use of EHRs and online communication with their patients. This provides a broader perspective on the physicians in the region—not just primary care ones, but specialists as well. Finally, chapter 4 also includes a critical incident survey on student "patients" from within a rural college community. These students' responses show just how unfamiliar members of this region were with not only EHRs but with online medical communication in general at the time of transition.

Chapter 5 represents a series of research studies that examined urban perspectives as described by both physicians and patients who had personally used online messaging within the secured portals of the UPMC Health System of Montefiore Hospital. These surveys gathered quantitative data on "perceptions of efficacy." This chapter reviews and analyzes these surveys in an effort to draw conclusions not only on how well this medium was seen as working (or not working) at the time of the survey, but also on how well these findings might help to inform future applications of EHRs and online communication for those who have not yet fully converted to this new medium. Chapter 5 concludes by drawing comparisons between the rural and the urban environments while reflecting upon the overall challenges and rewards that this conversion process has faced during this point in time.

Chapter 6 concludes by looking at how the medicological environment continued to change as a result of the introduction of EHRs and online medical messaging throughout the Obama Administration. It reflects on key paradigmatic shifts in physician training, research techniques in data mining, and security and privacy issues that together helped alter the very course of medicine for years to come. Finally, change is examined in light of the medium itself, which has transformed the private physician practices of the past into multimedia, multidisciplinary, global communication possibilities of the future.

THE FUTURE

Although each new technological medium within the medicological environment influenced public reaction and response, electronic messages within secured health portals have transformed the essence of the physician/patient dynamic and, in turn, the very face of healthcare for years to come. As Marshall McLuhan stated, the "electric" nature of this organic medium seems "to have outered the central nervous system itself" (1994, p. 247). Indeed, electronic messages have systemically redefined the physician/patient relationship by vastly increasing information access, altering the once paternal dynamic, and affecting the security and privacy of patient health records. The challenge of HIPAA regulations, EHR program development, interoperability between communication systems, and basic limitations of Internet and computer access remain. However, uncovering how this transition came about, examining the reactions and responses of the participants, and projecting what effect all of this might have on the future of healthcare all enables critical reflection, analysis, and knowledge acquisition for approaching similar transformations in the years to come.

NOTES

1. This language is reflective of concepts explored by Marshall McLuhan (*The Gutenberg Galaxy*, 1962; *Understanding Media: The Extensions of Man*, 1964) in which he discusses the "organic interdependence among all the institutions of society" (1964, p. 247) and by Pierre Teilhard de Chardin *(The Phenomenon of Man*, 1959*; Modern Spiritual Masters Series: Pierre Teilhard de Chardin*, 1999) in which he looks at the "biological event" of social consciousness. This concept has also been more recently discussed by Antonio Damasio, who speaks of "sociocultural neuroscience" (The Quest to Understand Consciousness, 2011). All have looked at the global space as it suggests a consciousness of society, culture, and even the neurological mind. When anything new gets introduced into a system, the entire system inevitably reacts, responds, and adapts.

2. Exercise and movement trackers included such brand name items as the Fitbit Surge, Basis Peak, Garmin Vivoactive or Vivosmart, Jawbone UP24, Mio Alpha 2, and Runtastic Orbit. Wearables for connected healthcare devices associated with "bio-sensing" included the new Apple Health app that connected to blood pressure monitors, scales, activity trackers, and other biomedical devices (Feibus, 2015).

3. For more information on this early app, go to https://www.vida.com/.

4. The FDA approved the Aprecia Pharmaceuticals' prescription drug, Spritam (levetiracetam), as a 3-D-printed pill that could be taken along with other seizure medications used for children and adults who had epilepsy. The pill was made by using a ZipDose technology, which produced "a porous pill that rapidly disintegrates with a sip of liquid" (Preidt, 2015).

5. The actual term "medical communication" was first coined by Polack and Avtgis (2011). Previously the term "health communication" was used exclusively. As will be further discussed, Polack and Avtgis focused more on the medical relationship and the art of communication specific to that interaction. Health communication tends to involve a much broader topic area including but not limited to public health education.

6. In his comments on ABC News on July 18, 2015 (Livni, 2015), Dr. Gregory Plotnikoff, medical director of the Center for Spirituality and Healing in Minneapolis,

Minnesota stated, “This [communication] is what good physicians have always done. We are just trying to make it more conscious and more rational, rather than just intuitive.”

7. See chapter 3 for a full discussion of the newly coined term “medicological environment.”

8. This act is discussed in detail in chapter 2 (specifically section 2.1.1). According to Medicaid.gov, the Affordable Care Act was composed of two separate pieces of legislation—the Patient Protection and Affordable Care Act (P.L. 111-148) and the Health Care and Education Reconciliation Act of 2010 (P.L. 111-152). Of all government legislation involving health access (and what has been referred to as “Obamacare”), this act made the issue of healthcare most personal to most of the American public.

9. EHR continues to be used interchangeably with “Electronic Medical Record” (EMR). As discussed in chapter 2, although some distinctions have been made between the two phrases, for simplicity sake, the term “EHR” is used throughout this book. EHR and EMR both refer to the medical record that is recorded electronically into an electronic folder which holds all records of a given patient. EMR typically refers to the individual record kept on each patient at a physician’s office, and EHR refers to the larger scope of medical records maintained by healthcare systems. Both seek interoperability of data and both represent the electronic availability and exchange of data. This book uses “EHR” as the preferred term for simplicity sake.

10. See chapter 2, section 2.0.3, for a full discussion of the Stages of Meaningful Use which needed to be met in order to acquire the incentive payments.

11. The term “medium,” as used within this book, is reflective of Marshall McLuhan’s axiom, “The medium is the message,” in which “medium” refers to the environment, substance, or, in this case, technology within which a message is transmitted. EHRs transmit messages in multiple ways. First, they contain the written word or documentation of the patient history; and, second, they contain the means for transmitting messages between the healthcare professionals and the public, namely the physician and patient. Further discussion follows.

12. This was the established scenario at the time. Some physicians, even during this time of transition, survived this retreat by downsizing their practices and turning to concierge practices in which fewer patients are accepted but given specialized treatment including same-day appointments, house calls, and tests—all for an annual or monthly fee (Wieczner J., 2013; Gerstner, 2012).

13. This did not happen at first. Even today there continues to be objections about whether patients have the right to see “all” of their medical charts. The Robert Wood Johnson Foundation researched this with their “OpenNotes” project (2015) and so have Michael and Margaret Warner in their “Patient Advocate” program (*Rise of the Patient Advocate: Healthcare in the Digital Age*, 2015).

14. In many physicians’ offices, test results are not reported back to the patient if they are negative. That is, the patient is not called to say that everything is okay. The patient is only called if the test is positive, meaning that there is something wrong, and they need to come in to see the physician or get further tests right away. The “no news is good news” applies in this instance, and yet it is a very difficult and unsettling way

to get negative test results. The waiting process can be long and worrisome. Some offices call no matter the results—positive or negative. Most, however, do not do this due to the vast number of tests being done on patients each day, the size of the practices, and the employee time it takes to have results called back to patients. Even the return call process could take several calls and several messages. In short, having the information in the medical chart with immediate results certainly means that positive results could be seen quickly, but it also means that they could be interpreted without the aid, knowledge, and consolation of the physician. This aspect will be discussed further in later chapters. It is important to keep this in mind, however, as the overall effect of all these factors are explored throughout this book.

15. Of course, all transmission of information must uphold the HIPAA of 1996. See chapter 2 for further explanation of this Act.

16. Many other benefits as well as limitations have been identified with the use of EHRs. The purpose of this segment is to provide a general overview of EHRs. See also chapter 2.

17. Go to http://www.infoplease.com/ipa/A0193167.html for an Internet timeline (infoplease.com, 2015). See also chapter 3.

18. Data mining is not the key focus in this book, but it is the direction that much of today’s research is going due to the more available electronic charts and electronic messages that can be stored and traced for data mining analysis. This portion of the analysis is discussed in chapter 6 as it is a look to the future of healthcare analysis, research, and overall understanding of this space.

Chapter 2

The Interlocking Perspectives

On February 17, 2009, President Barack Obama signed into law the American Recovery and Reinvestment Act of 2009[1] and, in so doing, indirectly yet permanently transformed the future of communication between physicians and patients. To the general public, the act represented an unprecedented effort to "jumpstart" the U.S. economy in hopes of creating and saving jobs, promoting economic growth, advancing educational programs, improving energy independence, stabilizing the economy, providing tax relief, and reestablishing this country as a competitive, modernized staple in the global economy.[2] However, to the healthcare industry, this act stood as the single most influential factor affecting how medical diagnoses, treatments, and services were funded; to physicians, it meant a complete overhaul of how to best care for patients while still surviving the financial costs and time factors involved in implementing new technology; to the patient, it provided hope for more available and affordable care; to the technology specialist, it implied expanded broadband access for rural and underserved America; and for the medical communication scholar,[3] it opened the door for the active use of a new medium for physician/patient interaction, namely active electronic messaging about health between physicians and patients.

Of the Recovery Act's $787 billion stimulus allotment, $19.2 billon funded the Health Information Technology for Economic and Clinical Health (HITECH) Act, which was intended to revitalize the U.S. healthcare industry through the adoption, "Meaningful Use," and secured transmission of health information technology.[4] This portion of the recovery opened the door to a transforming healthcare market destined to touch the lives of the entire U.S. population through dynamic policies, outcomes, and applications. The ongoing distribution of a wide variety of health technology funds affected not only political, social, and technological trends in society, but, most importantly, the changing communication patterns emerging between physicians and patients as a result of online interactions.

All those involved in the arduous task of implementing effectively and efficiently the many emerging policies faced the challenge of a practical utilization of the resources gained from the HITECH stimulus package. The purpose of this chapter is not to defend, promote, condemn, or even analyze the appropriateness of any of these policies. Rather, this chapter establishes the scene of the changing state of affairs in medical communication at this point in history. Although many of these policies continued to be challenged by political, institutional, and private sector groups, there was no turning back on healthcare reform. It promised to alter the very way physicians and patients would continue to communicate through electronic messaging in the years to come.

Here follows an overview of the existing governmental policies affecting the state of (1) physician practices, (2) patient needs and preferences, (3) public communication resources, and (4) overall medical communication patterns prevalent at this time. Each section focuses on how these policies shaped usage patterns and related issues associated with this newly mandated form of online, medical interactions. As these are reviewed, it is to be stressed that this chapter focuses on the elements of the policies that specifically affected electronic communication between physicians and patients. Given their complexity and scope, these policies influenced many other aspects of health-related policy.

POLICY AND THE PHYSICIAN PERSPECTIVE

Numerous regulations directly affected the way in which physicians treated and managed their patients. These evolved through changes in procedures, record storage, technology, and overall perception of patient/physician relationships. As Paul Starr (1982) noted in *The Social Transformation of American Medicine: The Rise of a Sovereign Profession and the Making of a Vast Industry*, the face of the private physician as sole practitioner with a single observation room and a wall of paper charts soon became a thing of the past. The transition into a world influenced by technology, government regulation, and corporate power made computer-mediated communication (CMC), with electronic charts, visits, and messaging, a common practice in this new medical arena.

The first portion of this chapter outlines how emerging policies began to alter the medical relationship from the professional, physician perspective.

The Hippocratic Oath

Prior to enactment of the HITECH Act of the Economic Stimulus Package in 2009, previous policies and guidelines affected the general communication patterns that guided acceptable and safe physician/patient interaction. The earliest and most reputable of these was (and still is) the Hippocratic Oath, "one of the oldest binding documents in history" dating as far back as the fourth century BC, a full century after the time of Hippocrates, the often-heralded Father of Medicine (Tyson, 2001). Without question, a physician must respect the privacy of the patient and work to the best of his or her ability and judgment in an effort to "do no harm."[5] Still taken today by medical students and physicians alike, this oath acts as a basic code of conduct for all physicians and has remained strongly endorsed by the American Medical Association (AMA).

Its key focus on the essential privacy of all medical transactions (and actions) makes this timeless oath applicable across all "mediums"[6] of communication in that it includes the basic principle of respect for the health and well-being of the patient no matter what the channel of communication—written, oral, telephone, electronic, or video alike.[7] This concept acts as an umbrella of influence over all communication between physicians and patients and remains paramount in the social agreement between the two parties. Although some have examined the oath as a form of epideictic rhetoric in light of the inherent relationship between historic core values and future principled actions, the medical profession fundamentally attests to patient privacy through the Hippocratic Oath. All subsequent policies must maintain this standard no matter the medium through which the communication occurs.

The Health Insurance Portability and Accountability Acts

HIPAA of 1996 stood perhaps as the next most influential guide for how physicians must treat patient information and health with a foundational emphasis on privacy and health safety standards.[8] This governmental policy originated from changes made to the Internal Revenue Code of 1986,[9] the Employee Retirement Income Security Act (ERISA) of 1974, and the Public Health Service Act (PHSA), which dated all the way back to July 1, 1944.[10] Framed as a fundamental health security law, it emphasized the enforcement of privacy rules (as outlined by the Office of Civil Rights); involved physicians, hospitals, and healthcare providers; ensured protection of all identifiable health information within medical records, billing, and patient accounts; and required consistent standards of documentation, handling, and privacy when dealing with records and communication with patients.

From the patient perspective, HIPAA granted federal protection of personal health documents, which could only be shared with those who had direct, health-related need for that information. This regulation on behalf of patients ensured that they would be safeguarded from outside sources such as insurance companies, employers, and family members who did not have legal rights to this information. HIPAA provided the standards and rules that maintained privacy of all medical records while also outlining the initial procedures necessary for legal recourse upon violation of these laws.

From a communication perspective, the 1996 HIPAA law also assured that information exchange mediums clearly maintained the standards set forth by the Hippocratic Oath. Not upholding this law would risk the loss of medical licensure and result in fines and judicial actions against the violating party. In a sense, HIPAA became the governmental standard of the privacy portion of the Hippocratic Oath.[11]

By 2008, as the Internet, emailing, and texting became more commonplace in the public sphere, the healthcare industry for the most part lagged behind by resisting the use of such technology and arguing that security, time restraints, and money made the use of technology in medicine inappropriate, risky, and too time consuming. Although relatively few physicians chose early adoption of EHRs and electronic messaging through emails, the government appeared to view this transition as a potential impetus toward growth in a waning economy laden with rising healthcare costs, insurance restrictions on coverage, and massive litigation cases that all promised to weigh heavily on the advancement of a healthcare industry seeming to spiral out of control.

In response, lawmakers not only anticipated change, they forced it. Well in advance of the enactment of the American Recovery and Reinvestment Act of 2009, HIPAA regulations were being reviewed; and the outcome of this review led to significant revisions in safety standards and security regulations that articulated online communication privacy issues, EHR development, and general security issues for storing medical data involving PHI on paper or electronic charts. In so doing, an updated version of HIPAA regulations was produced with the Patient Safety and Quality Improvement Act (PSQIA) of 2005 Patient Safety Rule. It was later published in the Federal Register in 2008 and enacted into law by January of 2009, just in time for the HITECH Act to be set into law in February of that very same year—seemingly no coincidence.[12] In short, this revised regulatory act created a system for providers to share sensitive information within a secured format.

Even though online communication within healthcare was still edging into popularity, some proactive physicians began to adopt online media, anticipating public demand. Those preparing the new HIPAA regulations also anticipated change. Regulations reassessed potential pitfalls of new technologies and included language that accommodated future safety and security issues. The 2005 HIPAA document stated, "The proposed rule sought to implement the Patient Safety Act to create a voluntary system through which providers could share sensitive information relating to patient safety events without fear of liability, which should lead to improvements in patient safety and in the quality of patient care" (Agency for Healthcare Research and Quality, Office for Civil Rights, Department of Health and Human Services, 2008, p. 70732). The stage was set for change.

Changes to HIPAA regulations continued as new advancements were made. Appearing in the *Federal Register: The Daily Journal of the United States Government* on January 25, 2013, the Department of Health and Human Services (HHS) presented a document titled "Modifications to the HIPAA Privacy, Security, Enforcement, and Breach Notification Rules Under the HITECH Act and the Genetic Information Nondiscrimination Act; Other Modifications to the HIPAA Rules" (Human Health and Human Services Department, 2013). This lengthy report documented newly specified security standards with additional revisions relating to electronic data. Security Standards General Rule Section 164.306 stated that all covered entities and business associates must "ensure the confidentiality, integrity, and availability of all electronic protected health information the covered entity or business associate creates, receives, maintains, or transmits."

In short, three areas of HIPAA compliance have affected how communication must be managed: (a) administrative safeguards, which required security compliance teams; (2) physical safeguards, which protected the electronic systems themselves from theft of equipment or data; and (3) technical safeguards, which authenticated and encrypted all accessible data. Hardware firewalls and encryption of electronic messages had to be monitored for upholding these standards (HIPAA 101: Guide to Compliance Rules and Laws, 2013). This is to say that HIPAA revisions went well beyond the earlier regulations by including important rules about technology, a change that those graduating from medical schools at an earlier date may not have been trained in without postgraduate education coursework.

At this time, it is important to note that Communication and Humanities Education in general continue to increase their influence on medical school and postgraduate education today. Within medical interviewing classes, students acknowledge the skill of communication in its effect on patient participation and health outcomes. In residency programs across the country, communication has become a standard requirement as outlined by the national Accreditation Council for Graduate Medical Education (ACGME).[13] Many state boards of medicine including the American Board of Family Practice acknowledge the importance of communication through Continuing Medical Education (CME) requirements. More specifically, the state of

Pennsylvania requires "safety hours" that include communication as a subcategory designated to help guarantee that physicians engage in safer, more effective medical interactions and overall care. Education on communication through HIPAA-certified regulations is indeed part of such training.[14] These continued changes in medical education increase the visibility of communication training and reinforce the relevance of such interdisciplinary research and ongoing study.

In short, although the later HIPAA revisions contained a plethora of details well beyond the scope of this document, the key point is that such ongoing regulations and revisions concerning security continued to be made into law with the motivation of maintaining high standards of privacy and healthcare reform throughout the entire process of electronic communication and record-keeping adoption. As change in physician/patient medical care (and education) continued, so have the laws regulating these changes.

The HITECH Act

Once Congress and the House of Representatives passed the American Recovery and Reinvestment Act and President Obama signed it into law, it served as perhaps the single most powerful economic overhaul since the New Deal of the 1930s (Murray & Kane, 2009);[15] and, certainly, with the HITECH[16] portion of this law, it became the most significant influence to date on healthcare reform. From a medical communication perspective, the HITECH Act promised to change the very face of the entire physician/patient relationship as mandates assured that all patients could access care whenever they needed it and in whatever form they desired—not just through face-to-face visits.

This right to patient care, as clearly articulated by the then Institute of Medicine's (IOM) Committee on Quality Healthcare in America in their book, *Crossing the Quality Chasm: A New Health System for the 21st Century* (2001), ensured that healthcare providers were accessible at all times through the Internet, telephone, and any other technological means in addition to in-person visits. This means that online communication between physicians and patients was not only welcomed but legitimately expected by consumers of healthcare. Although the IOM worked outside of the government, acting as an unbiased and authoritative advisor to decision-makers and the public, its advocacy ensured that most physicians were aware of the importance of electronic messaging—whether or not all physicians supported their perspective.[17] The IOM argued that a trusting, effective medical relationship involved multiple communication channels including but not limited to electronic messages.[18] Although this endorsement preceded the HITECH Act by nearly eight years and was made by an outside, nonprofit organization, it clearly indicated the climate of change that existed in the minds of many decision-making, influential organizations that helped prepare the groundwork for the law itself.

The government authority designated to carry out the laws of the HITECH Act was the HHS,[19] whose mission was "to establish programs to improve health care quality, safety, and efficiency through the promotion of health IT, including EHRs and private and secure electronic health information exchange" (HealthIT.gov, 2013). This department guided the implementation of the key eligibility standards physicians and hospitals had to meet in order to transition into EHRs in a manner that allowed for "Meaningful Use" (a new gauge for measuring how effectively health professionals implemented the use of certified EHRs).

In an effort to explain why this act was so important to the changing face of medical communication, it is necessary to outline the process that physicians and hospitals alike were required to go through to comply with the laws outlined by this act. In so doing, the complexity, cost, and challenge of this transformation into EHRs becomes evident. At the same time, the effort put into this process by so many physicians and hospitals who had already begun the implementation of EHRs suggested that this transition would not and perhaps could not be undone. In a sense, there was no going back to the paper chart, the single exam room, and the face-to-face physical exam as the *only* option. The IOM and those recognizing the power and influence of this entire change insisted that the traditional mode of physicians' visits was not lost; it merely was enhanced by options of communication that technology already introduced to the public. These new options could not be "un-introduced." The face of medicine indeed spiraled forward into a communication context filled with a technology that promised to alter the very nature of physician/patient interactions well into the future.

Meaningful Use Defined

According to HealthIT.Gov (EHR Incentives and Certification, 2013), "Meaningful Use" was a measurement of how effectively and efficiently physicians and hospital organizations converted their paper medical charts into electronic form. Beyond the actual conversion process, Meaningful Use assessed the level of quality improvement, safety and security of PHI, health disparity reduction, coordination of patient care between hospitals and physician offices, and active collaboration with patients, families, and caretakers. Medically, the most important goal for Meaningful Use was to result in better clinical outcomes through improved transparency of medical diagnosis, treatments, and procedures. Collaboration of care and record-keeping between physicians, patients, hospitals, and ancillary services through interoperable systems, remained a goal for the efficient, effective, and secure EHR systems throughout the country.

In a sense, the entire system of physician/patient communication flowed out of EHR technology, making not only the recording of information important but the way in which the information was gathered, transmitted, and discussed important as well. To “meaningfully use” this technology from a government standard was clearly outlined through a set of criteria which were necessary for effective implementation of this vastly influential change. To meaningfully use this technology from a patient perspective perhaps meant to succeed in helping *patients* participate in the medical communication process in order to be engaged within the system and be cooperatively responsible for the *shared* goal of improved health.

Interoperability of these systems of communication and record-keeping was yet another aspect—and problem—of the Meaningful Use agenda. Systems did not “speak” to each other (1) because most were being independently created by over 600 individual vendors (Lynn, 2012) and (2) because the coordination and sophistication of technology had not yet reached this point.

An example may serve to clarify the existing state of affairs: Even the Department of Veterans Affairs (VA), government-run hospital system had not yet managed this feat of interoperability. In fact, a bill introduced into Congress on June 28, 2013 (113th Congress, 1st Session, 2013)[20] set a firm timeline for integrating records of the Department of Veterans Affairs and the Department of Defense (DOD) arguing that “a bridge between active service and post-discharge health records by maintaining interoperability be established within 180 days of the bill’s enactment” in a legislation called the “21st Century Health Care for Heroes Act” (Bresnick, 2013). In 2009, the DOD and VA first attempted to create an interoperable system called an “iEHR.” It was to allow service men and women to have a single EHR throughout their entire military career; however, this did not happen. Although efforts continued through Congress to force such interoperability standards to be imposed in the government VA hospital system, the goal was not met. Certainly, if such an effort was to be reached through a single agency (vast though it was), the thought of imposing a nationally or one-day globally interoperable system seemed almost impossible, at least at this time of technological change.

Interoperability between systems existed as a major stumbling block for true collaborative care. The Office of Standards & Interoperability (OSI) at the U.S. HHS strove toward a seamless sharing of protected data between all stakeholders including patients, physicians, hospitals, and government agencies with a mindful requirement of protecting private data within secured networking systems. According to HealthIT.gov, there were four areas of EHR technology that were particularly critical:

- How applications interacted with users (such as e-prescribing)
- How systems communicated with each other (such as messaging standards)
- How information was processed and managed (such as health information exchange)
- How consumer devices integrated with other systems and applications (such as tablet PCs) (HealthIT.gov, 2013)[21]

Notably, the area of electronic messaging between physicians, patients, and other healthcare professionals were noted as key issues in this inoperability challenge.

Privacy and security standards could not be compromised throughout the conversion process. Secured messaging (not open-source messaging) was vital to the integrity of this transition. Communication through secured channels had to be assured by both the physician and the patient in order that a trusting, safe, confidential environment might encourage open lines of communication within the medical relationship.

If interoperability was to work as a key goal of Meaningful Use, it had to assure the integrity and privacy of the medical record along with any communication referring to or written by patients. All communication that was recorded within the medical record system had to remain protected, especially once interoperability was reached. The task was great; the outcome was yet to be seen.

Meaningful Use from an Economic Perspective

To assist and motivate physicians and hospitals to work toward Meaningful Use, the government implemented a qualification program of incentive payments for Medicare and Medicaid participating providers through the Centers for Medicare & Medicaid Services (CMS.gov, 2013).[22] As part of the $19.2 billion HITECH Act stimulus package, eligible participants who showed Meaningful Use in converting their records to EHRs might receive payments up to $44,000 dispersed over a five-year adoption period through the Medicare EHR Incentive Program and up to $63,750 dispersed over a six-year adoption period through the Medicaid EHR Incentive Program. Of course, providers had to treat Medicare and Medicaid patients and had to demonstrate prescribed standards of usage (Centers for Medicare and Medicaid Services, 2013). All eligible participants were required to register for each EHR incentive program and then "attest" to meeting the requirements.[23] This incentive system was designed in stages for adoption and appropriately called "The Stages of Meaningful Use."[24]

In brief, the stages projected implementation deadlines. General purposes were outlined as follows: Stage One (2011–2012) for data capturing and sharing; Stage Two (2014) for advance clinical processes; and Stage Three (2016) for improved outcomes.[25,26] Final criteria for all three stages remained pending. Stage One only finalized specific criteria and began to accept proof of Meaningful Use as of July 2010. In short, the outlined plan was clearly stated at its onset, but over time the dates and requirements remained open for reassessment throughout the entire process concerning timelines, rules, and extensions that were readjusted year to year.

At the onset at least, for Stage One, all eligible parties had to be examined on twenty-five total criteria with fifteen required core competencies and five out of ten menu requirements. Although reaching Stage One Meaningful Use was considered voluntary and was rewarded with maximum incentive payments, federal laws required that Medicare reimbursement rates for nonparticipating physicians would decrease for all eligible professionals who did not meet Stage One requirements by 2013 (technically within ninety days of the end of the fiscal year, which was September 30, 2012) and was predicted to see at least a 1.5% Medicare payment reduction by 2015 or sooner (American Medical News, 2012). Some projected deeper, longer-lasting penalties in reimbursements for subsequent years by 2% in 2016, 3% in 2017, 4% in 2018, and as high as 95% in future years (MedicalRecords.com). There was no way of predicting for certain the extent or effect of these penalties over time, but there was a clear threat of a serious reduction in reimbursement for those who did not comply. Incentive payments motivated some to change while penalties threatened to encourage others to plan for an early retirement or seek a new profession—all to avoid EHR conversion or reduced compensation rates (Pittman, 2013).[27]

Surprisingly, despite the backlash and resistance to Stage One Meaningful Use, the government surged ahead on requirements of Stage Two, which were already slated to begin application for reimbursement payments on January 1, 2014, for physicians and October 1, 2014, for hospitals. Many challenged the aggressive push forward when not all eligible parties had yet to complete Stage One. For instance, the AMA and the American Hospital Association (AHA) challenged these dates, arguing that requirements were too stringent and too soon for adequate conversion for most of the users. Although the AMA and the AHA supported widespread adoption of EHR systems, they felt that flexibility in the programs was necessary in this already "over burdensome" set of laws (Commins, 2013).

A specific example of this resistance was recorded in the AMA's "Proceedings of the 2011 Interim Meeting of the House of Delegates," which were approved on June 17, 2012. In their "Reports of the Council on Medical Service" (AMA, 2012, pp. 85–111), particular attention was given not only to the lack of readiness and pressure experienced by the healthcare profession in responding to the push of this new law but to the problems emerging with EHR safety, accuracy, and standardization (something that EHRs promised to rectify, not increase). It was further stated that formats would "impede the provision of quality patient care and impact patient safety" as the lack of a standardized report format through EHR record-keeping and transfer of data had "the potential to increase interpretation errors and decrease efficiency as physicians review[ed] unfamiliar reports with varying layouts" (p. 91). In addition, it stated, "While standardizing report formats and terminology hold the potential to reduce interpretation errors, improve quality of care and promote patient safety, there are concerns that standardization could overly simplify results and unintentionally omit critical information" (p. 91).

Ironically the AMA argued that standardization on the one hand could increase interpretation errors with variable report formats while on the other hand might increase errors because of the oversimplification of the formatting. The lack of standardization and the abundance of it was thought to lead potentially to serious error. The system did not appear to be "fool proof" by any means. The AMA argued that further assessment of these stages was needed before rushing forward to subsequent stage requirements. In addition to these reservations concerning Stage One, the AMA argued that "Stage Two standards [were] too aggressive and burdensome for physicians" and that "the Meaningful Use EHR program [would] remain low unless the Stage Two requirements [were] made more flexible" (American Medical Association, 2012, p. 91). Certainly a "red flag" was raised by the AMA warning governmental agencies to slow down (not speed up) the process for the sake of staying on the original schedule established by the HITECH Act.

Even the American Academy of Family Practice (AAFP) through a letter by Board Chair Glen Stream, MD to CMS Administrator Marilyn Tavenner on August 7, 2013, requested that Stage Two Meaningful Use be delayed by at least twelve months for fear that the program would "outstrip the capacity of many certified electronic health record technology vendors and ambulatory family medicine practices" (Leawood, 2013). Stream further argued that "2014 brings a perfect storm of regulatory compliance issues for family physicians that, we fear, may derail health information technology adoption and substantially interfere with our shared progress toward achieving better care for patients, better health for communities and lower costs through improvements to the health care system" (Leawood, 2013). And this is only one of the many professional medical academies which voiced their opinion on delaying this move forward.

Despite these warnings, governmental agencies proceeded forward, however not without caution. On August 16, 2013, the Healthcare Information and Management Systems Society (HIMSS) called for changes in the Stage Two Meaningful Use timeline by suggesting that the attestation period be extended a full eighteen-month period (through April 2015 for eligible hospitals and June 2015 for eligible physicians) to allow time for those who had purchased EHR systems to upgrade their technology versions of electronic records in time for the Stage Two deadlines. The AHA supported this as being the most realistic extension for attestation while allowing those ready to proceed forward to still be allowed to do so (Murphy, 2013).

With such concerns over the progress of Stages One and Two, plans for Stage Three remained on target but certainly were far from finalized. At best the U.S. HHS suggested that discussions at least continue with a three-part focus on Meaningful Use objectives and measures, quality measures, and, again, privacy and security. A preliminary and quite detailed document was created in October 2012 called the "Meaningful Use Workgroup Stage Three Recommendations" (Tang & Hripcsak, 2012). The timeline outline was quite specific as well with a proposed approval of final Stage Three recommendations by April 2013. This deadline was obviously not met. Further discussion and analysis of the entire Meaningful Use process remained open for continued review and revision. Nevertheless, a very strong impetus for change and immediate change continued to exist throughout governmental offices with little sign of letting up.

Indeed, this relentless progression forward continued through to 2016, at which time a transition into a new Merit-Based Incentive Payment System (MIPS) emerged, promising to "consolidate the Meaningful Use, Physician Quality Reporting System, and Value-Based Modifier programs into one streamlined system" and to allow physicians to see "positive or negative reimbursement adjustments under MIPS starting in 2019, based on their 2017 performance." At the time of the Stages of Meaningful Use implementation plan, the public, however, had no idea this was on the horizon.

Meaningful Use from the Physician Perspective

The real issue concerned how all this translated into the day-to-day practice of medicine with real patients who needed medical treatment and real physicians who needed to run a business in order to help their patients. What did this mean to the average physician who wished to convert to electronic charts because he or she believed they made sense in a changing technological world yet knew that expenses might be insurmountable for most practices, especially smaller solo ones not supported by larger hospital assistance? Could all this really help the physician/patient relationship or was it destined to dismantle the very essence of the "trusted relationship" so integral to the safe environment of the private office visit? These questions were not easily answered. Perhaps they could not even be answered until this chapter of the changing face of medicine unfolded in years to come.

A look at the 2014–2015 existing state of affairs in physician implementation serves to shed some light on just how well this mandate was working so far as motivating physicians (and hospitals) to move forward with this massive undertaking. The U.S. healthcare system was being hurled toward an ideal of online communication, interoperability, and technological transformations without realizing the unforeseeable extent to which this technology would affect the very core of what it meant to treat and communicate with patients. This was not to say that such ideals were not possible or even probable. It was to say, however, that the conversion to online medical communication through the first step of EHR implementation was at the time an unknown entity in the ever-changing future of healthcare.

Early on, many assumed that if providers would purchase, set up, and verify Meaningful Use of insurance payments, e-prescribing, and general medical record-keeping, physicians would be motivated to become early adopters, which would help jumpstart the implementation program and help assure that a significant number of physicians would meet the goal by the original Meaningful Use deadline year of 2014. Published reports from 2003 and 2004 indicated that projected average start-up costs of a single physician in 2009 ranged from $15,000 to $30,000 with annual maintenance fees up to $5,000 (Adler, 2004; Wang, Middleton, & Prosser, 2003). This amount, of course, depended on whether the physician purchased the server, used cloud back-up services, or a combination of the two.[28]

Although the incentives from Medicare and Medicaid alone addressed some of the upfront expenses, this did not include the ongoing software upgrades that paralleled the ever-changing regulations mandated as the stages were updated, the training of employees, the cost of maintenance fees, and the like. In fact, despite such projections, there was no way of knowing (1) how much the actual transition into EHRs would cost per practicing physician considering all factors not just including actual EHR equipment itself, (2) what direction the software and supply companies would need to go as changing goals and expectations surfaced, (3) how high costs would rise as organizations and individual physicians changed EHR systems due to unsatisfactory or inadequate performance (Dolan, 2013; Denton, 2013; iHealthBeat, 2013),[29] and even (4) what legal costs might emerge as a result of physicians and hospitals suing EHR vendors for inadequate products (Gallegos, 2013).

Despite this seemingly bleak picture, physicians and hospitals continued purchasing and implementing EHR systems, meeting Stage One requirements and working toward satisfying Stage Two criteria. According to a review in *Healthcare IT News* (Miliard, 2013), $15 billion in Meaningful Use incentive payments had already been distributed by the Centers for Medicare and Medicaid Services to eligible participants by 2013. According to a Robert Wood Johnson Foundation special report, not even half of the eligible hospitals and physician practices had met Meaningful Use (Robert Wood Johnson Foundation, 2013). Specifically, 42% of hospitals had met functionalities for Stage One and more than 38% of physicians had reported adoption of EHRs in 2012.[30] Although numbers for the percentage of physicians meeting Meaningful Use were not yet available at the time of this Robert Wood Johnson study, the reimbursement figures still seemed rather alarming considering that over 78% of the total money reserved from the $19.2 billion budget for the HITECH Act had already been distributed (even without Stage Two and Three formally initiated).[31]

Reports on specific usage patterns of those who had implemented EHRs seemed to reveal a relatively favorable pattern, at least for those who already had reached Meaningful Use. For instance, in a 2013 survey of 1,820 PCPs and specialists in office-based practices using EHRs, 80% were viewing laboratory results of drugs, 74% ordering e-prescriptions, 67% recording clinical notes, 34% generating lists of patients by demographic characteristics, 31% generating quality metrics, and 14% providing patients with electronic copies of their health record information (DesRoches, Audet, Painter, & Donelan, 2013).[32] Of the physicians surveyed, 43.5% reported having basic EHRs, and 9.8% met Meaningful Use.

A later announcement made by Farzad Mostashari, MD, National Coordinator for Health Information Technology,[33] in a testimony before the Committee on Finance of the U.S. Senate by the Department of Health and Human Services on July 17, 2013 (Mostashari, 2013), offered a much more positive overall interpretation of health information technology. According to Mostashari, as of May 2013, over 293,000 eligible professionals (over half of physicians) and over 3,900 eligible hospitals (80% of the total hospitals) had received incentive payments from the Medicare and Medicaid EHR Incentive Programs. That represented nearly 80% of eligible hospitals and over half of physicians and other eligible professionals. As of May 2013, more than 220,000 of the nation's eligible professionals and over 3,000 of the nation's eligible hospitals had achieved the requirements for Stage One Meaningful Use. Tens of thousands more had qualified for Medicaid incentive payments for adopting, implementing, or upgrading to certified EHRs. These statistics indicated a much higher adoption level than those reported in the studies noted above and suggested that the data from this more recent study might represent different population samples over a much later time period. No citation was given for these numbers, forcing their credibility to rest on the reputability of the National Coordinator.[34]

Mostashari went on to state, "Technology is just a tool—but it is a critical tool that can foster much-needed innovation in entrenched industries. The nation's healthcare system is poised for a transformation in how care is delivered and is paid for and how patients engage in their own health and health care." He later added, "We want providers to thrive in the new health care marketplace that puts a premium on value over volume, on coordination over fragmentation, and on patient-centeredness overall."[35] Throughout his entire talk, he reinforced the notion of patient-centeredness and engagement as the goal of new technology and insisted that physician and hospital participation really embraced the trend of active participation with patients in achieving improved health.

Meaningful Use from the Patient Perspective

As demonstrated throughout the preceding references, much of the rhetoric surrounding news reports, public statements, and government websites suggested that the entire purpose of this change was for the good of the patients in order that their shared participation might lead to better care, more care, and/or even less expensive care.[36] Words and phrases used included "instruments in their own care," "engaging the patient," "patient-centeredness," "cooperation," "collaboration," "shared decision-making," and "participatory care." As these filtered onto the pages of government documents, health literature, and educational policy for healthcare professionals, the image formed of physicians, hospitals, and even government services all working together to place patients at the center of concern. The ideal goal was to help patients help the providers improve care for all. Healthcare providers (HCPs) not only created benefits for patients but also helped ensure that effective, patient-centered change actually occurred. As active participants, patients would have invested time, energy, and commitment to the process and therefore would hopefully be more likely to accept the transition into this new medium of communication when it came into final force (Stage Three Meaningful Use or beyond). Implementation of technology, cost efficiency, reimbursements, time management, and the like were viewed as necessary for improved health for patients. Patients were as much a part of this transition as were physicians, hospitals, and government officials. In fact, they were the most important part and the reason for this change in the first place. This was the ideal that seemed to permeate the rhetoric of shared participation and improved standards of care.

The purpose of this segment *is not* to assess the legitimacy of these claims or the overall desire for physicians to meet their Hippocratic Oath, lawmakers to serve their people, and economists to meet the bottom line so that medical facilities could afford to keep their doors open. The problem was as complex as the entire economic situation surrounding the objectives to enforce, finance, and implement the HITECH Act itself. The real purpose is to determine what this really meant to the *patient* who perhaps cared more about the heart attack grandpa just had, the breast cancer with which mom was diagnosed, or the laceration to the head that knocked Tommy unconscious on the football field than about which Stage of Meaningful Use his or her physician met.

The whole medical situation was complicated—to say the least. In fact, one of the reasons for describing in such detail the policies affecting the healthcare market is to place this entire scenario into perspective and to show that indeed many people were influenced by these standards, many were players in this complicated drama, and many simply reacted to the services they could or could not acquire when they most needed them in the midst of an illness, emergency, or tragedy.

The purpose of this segment *is* to explain in simple terms what Meaningful Use meant to the patient from a receiver's perspective. What effect did this have on the lives of those who unknowingly entered a system that was not what it used to be? When an elderly patient walked into her physician's office hoping to chat about her husband's forgetfulness and her own debilitating arthritis, she might not anticipate a kiosk computer for "signing in" and a physician whose face remained hidden behind a laptop screen. These technological mediums affected the fundamental process of communicating with one's physician, and to some that process was all but "meaningful" when technology took away the familiar environment of the traditional examination room and replaced it with (the backs of) computer screens.

Meaningful Use was viewed as the desired transition into this new medium in a manner that was efficacious and was perceived to be working from the perspective of the patients, not only the providers. This perhaps was the real test of Meaningful Use, a test that was not so easily measured in numbers or dollars. Rushing to meet Stages One, Two, and Three deadlines in 2014, 2015, 2016, and 2020, respectively, for that matter, meant very little to patients. Their only concern was when and if the familiar face-to-face office visit would be replaced with something new and perhaps less meaningful and more confusing, less personal and more isolated, less trusted and more suspicious, and less real and more artificial. Hopefully, this list of negative possibilities was not realized, especially if patients saw themselves as part of the necessary process to achieve a better healthcare world that used technology as a means for reshaping the focus back to the patient, the real center of concern. Until the patient navigated through the new and adjusted to the different, this might, however, be quite a foreign process. Fundamental for making this transition meaningful was to explain to the patients how these stages affected their own communication within this dynamic system. With the exception, perhaps, of indirect references to technological problems within physicians' offices, however, this explanation was not being made.[37]

It is also important to acknowledge that patient demographics influenced how well this change was handled. Social status, educational training, and literacy levels (to name a few) had always had a direct effect on how easily and effectively patients navigated the healthcare system. In addition, there was the issue of media literacy, which rises into paramount importance with the introduction of the new EHR medium. Some patients entered a physician's office with a smartphone in hand and a list of potential diagnoses, treatments, and options ready to be discussed while others relied on newspaper articles, television and radio advertisements, and family conversations. Many forms of obtaining and transmitting health information existed; but not all forms were understood, accepted, or made accessible by all. In short, a key demographic for measuring how meaningful the next visit to the physician's office would be might very well have had to do with the patient's level of media literacy.

To make matters even worse, not only were some *patients* media illiterate or media challenged, so too were many *physicians*. That means that as some physicians attempted to meet the technological demands of their new EHR system, they spent more time trying to navigate the computer screen than paying attention to the worried looks on their patients' faces.[38] Arguably, if the medical communication was to be effective within the physician/patient dyad, both parties needed to understand the challenges and shortcomings as well as the benefits and advancements of this new medium of communication. If patients were truly to "share" in the medical encounter, then they together with the physician had to learn to navigate through the transition into EHRs. Sadly, much too much time had been spent transitioning into the *mechanics* of the process than into the *relationships* that were to survive and benefit from these so-called advancements.

To better understand this situation, the key elements of the Stages of Meaningful Use needed to be viewed from the perspective of the consumers, that is, the *receivers* of and participants in their own medical care. Then and only then could this process be a truly joint endeavor toward physician/patient communication.

Just as the stages reflected a wealth of intricate changes and implications to physician and hospital practices, the stages were never really explained with the same level of complexity to the patients themselves. More practically, however, only the most basic implications of each stage were necessary for the vast majority of the patients to understand why change was being made, how this might affect their communication with their hospital or physician's office, and what to expect throughout this transition period. For some physician offices, added forms of technology were introduced prior to the HITECH Act. These included emailing patients through nonsecured public domains, referencing the Internet on smartphones, and using a computer to record information. This analysis, however, focuses primarily on physician practices and assumes that the offices made a cold transition from using no electronic technology with patients (other than perhaps secretary billing which had been around for twenty or more years for most practices) to the minimum technology required for each stage.[39]

Quite simply, Stage One introduced computer technology to the physicians' office through the active use of recording EHRs. Four key items affected patients: (1) electronic prescribing, (2) electronic recording of patient records, (3) moderate patient electronic access to medical records, and (4) the introduction of computers into the examination room. First, prescriptions were sent to pharmacies electronically to reduce legibility errors, speed the process for patients, and maintain an accurate, updated record in the patient chart. Second, records were converted into electronic form. At first this may have meant that earlier paper chart records were merely scanned and uploaded into the electronic chart with updated insurance and demographic information. As physicians documented subsequent appointments and interactions, the data was then recorded manually directly into the electronic chart through either open-ended descriptions or predetermined, standardized "check-box" options entered through a "click" by the physicians (and sometimes nurses). Third, the option was provided for patients to access a copy of a portion of their chart (as approved by the physician) through an electronic means, typically a computerized disc (CD) copy. Fourth, the computer, laptop, tablet, or iPad was brought into the room by the physicians and nurses. As discussed in subsequent chapters, this aspect for the most part was the most noticeable of all the changes to patients because they could physically see the computer, could watch the physicians put in data, and could contend with the distracting presence of this new instrument which often blocked shared eye contact between the physician and the patient.

Stage Two presupposed the following changes for patients: (1) increased visibility, access, and involvement in Stage One implementations and (2) invitation to participate in an online, secured patient portal. Firstly, each phase of Stage One continued at a more active and proficient level (based upon the increased requirements that physicians needed to verify through their Meaningful Use attestation). Secondly, patient involvement improved with the implementation of the secured patient portal. This meant that patients could enter their EHRs through a private environment using a secured user name and password, allowing for patient access to such things as immunization lists, lab reports and test results (once reviewed and released by the physicians), appointment scheduling, e-prescribing information, billing questions, general medical information or office announcements, and medical communication with the physician/office staff. In short, this single change transformed the availability of the office from regularly scheduled hours and answering machines to twenty-four-hours-per-day, seven-days-a-week access to patient information and (for the most part) communication with the staff.

For the first time, this window provided online communication directly with members of the staff and physicians, opening the door for a totally new mode of medical communication.[40] It also allowed patients to see much of their medical information (again, as permitted by the physician) and to participate more directly in their own care. Demographic, insurance, and health-related information could be entered even prior to seeing the physician for the first time. Records from other physicians could be uploaded and scanned immediately into the chart. The records were now accessible directly instead of only through an electronic copy (as in the CD). The means for communication was potentially continuous.

Finally, Stage Three changes were predicted to make marked improvements in communication, accessibility, and document access. It was assumed that this change would likely allow patient data to be accessed through larger record-keeping data banks facilitating decision support for national high-priority conditions (such as national emergencies or health conditions like flu epidemics), patient access to improved self-management tools (such as uploading glucometer readings for diabetics or heart monitor readings for cardiac patients), and access to comprehensive patient data through patient-centered Health Information Exchange (HIE) that enabled interoperable transference of health records and immediate access from one institution to the next (HealthIT.gov, 2013).[41] The latter goal was thought to be particularly helpful to patients who traveled, utilized a wide variety of specialists, or had testing done in more than one location for the same thing (such as when urban hospitals requested repeat testing due to lack of access to rural hospital results or testing standards). This also meant that data from patients could be entered into a national data bank which was anonymously used to predict disease trends or data mine for information that could lead to scientific discoveries or cures. From the patient perspective, however, it was likely that the most important change to them would be the ability to have a more unified patient profile and to be able to coordinate care seamlessly from facility to facility.

In brief, the key to the entire process of describing the Stages of Meaningful Use to patients was to prepare them for how computer technology would alter their ability to maintain unified records and to communicate with and between their providers, anticipating a more participatory level of care.

Policy and the Patient Perspective

From the patient perspective, by far the most transformative act associated with the HITECH Act of 2009 was the Patient Protection and Affordable Care Act (111th Congress, 2010), better known as the Affordable Care Act (ACA), or, simply, "Obamacare."[42] It was signed into the Patient Bill of Rights on March 23, 2010, and later revised as the Health Care and Education

Reconciliation Act of 2010 (111th Congress, 2010)[43] on March 30, 2010. Many features of this act directly affected health issues for patients including but not limited to new consumer protections, objectives to improve quality of care, and of course "affordable care" for all U.S. citizens.

The Affordable Care Act

This law acted as a series of insurance reforms that followed a developmental timeline in keeping with the Stages of Meaningful Use. In 2010, a new Patient Bill of Rights went into effect allowing free preventative services to begin for many. According to a summary on healthcare.gov (U.S. Centers for Medicare & Medicaid Services, 2013), key features listed included coverage for children with preexisting conditions, coverage for young adults under twenty-six, no more lifetime limits on coverage, no more arbitrary cancellations or rescissions, the right to appeal health plan decisions, a consumer assistance program, a small business tax credit, temporary coverage for people with preexisting conditions, and new community health centers. The 2011 programs for seniors allowed for prescription drug discounts, free Medicare preventative services, the 80/20 Rule (Medical Loss Ratio), and a total rate review.[44] The 2012 projections added preventative services for women and an "easy-to-understand" *Summary of Benefits and Coverage*. On October 1, 2013, the open enrollment began with possible coverage starting as early as January 1, 2014. This included coverage for preexisting conditions, savings on monthly premiums and out-of-pocket costs, Medicaid expansion, no more yearly limits on coverage, and expanded small business tax credits. On March 31, open enrollment was to close; and, by 2015, when Stage Three Meaningful Use was originally projected to be completed, an employee-shared responsibility payment was set to begin.

Patients Placed "In Charge"

According to the HHS website (U.S. Department of Health and Human Services, 2013), the Affordable Care Act put "consumers back in charge of their health care." This website discussed specifics concerning care[45] but more significantly reinforced the perspective of patients having the freedom to choose how, when, where, and by whom they could acquire their medical coverage. This "choice" aspect likewise strengthened the argument that not only should healthcare be "affordable" by all, but it was to be designed for the central benefit of the patients who were now to be viewed as "back in charge" of managing their own personal health goals.

For the first time, patients were said to have a level of control over their own care. They could choose their own physician, hospital, health insurance plan, and even mode of communication (electronic, face-to-face, written, etc.). Indeed, weaved throughout this entire process of policy writing, legal enactment, education, and application of this new healthcare perspective, the patient was considered the focus of concern, the focus of change, and the focus of engagement.

From a patient perspective, the Affordable Care Act was designed to help patients improve health access while the Stages of Meaningful Use were designed to increase patient participation through secured health portals and EHRs. Granted, the government objective was to decrease costs in multiple ways such as having interoperable systems and decreasing unnecessary, expensive repeat testing. The framing of how these policies were portrayed to the public, however, focused on patients engaging in the process, becoming more responsible in monitoring their own health by uploading items onto the medical records (e.g., blood sugar lists), and corresponding with physicians online at a much less expensive rate (or at no cost) in order to improve efficiency and effectiveness. The framing was around patient care (even though the policies involved certainly went well beyond this single focus).

Policy and the Media Perspective

Two interlocking issues existed from the perspective of the media itself: universal access to online communication and increased mobile communication. Simply put, the ideal goal was for all members of society to have equal ability to access health records and to communicate with healthcare professionals online through as many mobile and electronic means as possible. Most importantly, unless broadband capabilities and high-speed Internet functionality could reach urban and rural areas alike, not all U.S. physicians could participate in the goals of Meaningful Use and not all members of the general public could meet the 2008 Institute of Medicine's criteria for equal opportunity for all to communicate with their physicians through any and all mediums of communication. Second, as technology speed and efficiency advanced, monitoring the security and privacy of the media itself was likewise critical.

Again, in order to present only the most relevant of the policies, programs, and mobile advancements related to the HITECH Act's mandates of online communication with patients, it must be noted that many more policies and references to policies existed than are discussed herein. This segment is intended to give a flavor of how media itself was related to the overall concerns for communication in an equitable and safe online world.

The Telecommunications Act of 1996

In the same year that the HIPAA overhauled health insurance and security issues in medicine, the 1996 Telecommunications Act launched as "the first overhaul in telecommunications law in almost 62 years" (FCC.Gov, 2013).[46] Revising everything from local and long-distance telephone service, cable programming, and broadcasting services, it created "fair rules for this new era of competition" in order that all industries that used media services could access and use them in an equitable manner (FCC.Gov, 2013). At the time, Congress empowered the Federal Communication Commission (FCC) to provide rural HCPs with "an affordable rate for the services necessary for the provision of telemedicine and instruction relating to such services" (Federal Communication Commission, 2013). Subsequently, a year later, the FCC established the Rural Health Care Telecommunications program, which ensured that rural and urban providers would pay the same rates for all telecommunication needs. In 2003, the Rural Health Care Internet Access program had reduced the costs of Internet access by 25%, making it even more affordable for smaller physicians' offices and rural health-related businesses. These two programs combined were then called the Rural Health Care Primary Program (FCC, 2013).

What made these initial programs so important to healthcare was that for the first time access to Internet and related programs became affordable, enabling all offices to begin the process of creating websites and communicating online with other insurance companies, vendors, and eventually patients. Rural health practitioners, so long as they had the availability of broadband access, could compete with larger urban centers without having to pay more for the same service as their larger urban counterparts. Like HIPAA, this act enabled providers to stand on equal ground and laid the foundation for what was to come: mandatory EHRs and secured portals.

The Rural Health Broadband Initiative

In all, the objective of increased broadband access for rural and urban healthcare facilities alike was a product of over fifty pilot programs introduced to and monitored by the FCC. One program of significance surfaced in 2006, ten years after the major FCC overhaul, called the Rural Health Care Pilot Program. Its purpose was to reform the Rural Health Care Primary Program once it was determined that the FCC needed to improve its support of rural areas in their ability to achieve nationwide broadband health networking services. The goal was to connect rural and urban, and public and private, nonprofit healthcare providers. Although some questioned the effectiveness of this developing program (Whitten, Holtz, Krupinski, & Alverson, 2010),[47] broadband access for the most part became increasingly more accessible.

On December 12, 2012, in hopes of continued support of this success, the FCC created the Healthcare Connect Fund (HCCF) which (1) continued to expand the availability of robust broadband networks and (2) allowed the leadership and monitoring necessary for physician and hospital implementation of the HITECH Act's various Stages of Meaningful Use. Even more expansively, the HCCF helped healthcare providers to organize consortia to enable networking that allowed access to greater bandwidth, higher quality of connectivity, and lower rates than available to individuals (Federal Communication Commission, 2013). In effect, the HCCF allowed for improvements necessary for the emerging capability of true interoperability, the ultimate goal for achieving shared data and improved patient accessibility.

By the end of 2012, while providers were actively applying for Stage One Meaningful Use approval, the Wireline Competition Bureau, the organization responsible for overseeing the HCCF (along with the Rural Health Care Telecommunications and Internet Access Programs and the Rural Health Care Pilot Program), reported that the pilot programs successfully expanded broadband networks for interested healthcare providers throughout the entire country in a manner that demonstrated cost-effectiveness, simplicity of use, and "network-facilitating" capabilities.[48] Thanks to these programs, medical specialists throughout the system could obtain increased government support through the various FCC programs to continue toward Meaningful Use.

The mHealth Task Force

Also, in 2012, the FCC along with a wide variety of private, academic, and government leaders in wireless health technology gathered for the very first mHealth (mobile health) Summit. This meeting led to the creation of an independent mHealth Task Force that made a number of eHealth policy recommendations to the FCC, to other federal agencies, and to the general health industry. The goal was to make mHealth standards routine in hospital- and physician-based practices and basically throughout all health organizations by the year 2017. A document produced by this group was presented to the FCC (Federal Communications Commission, 2012).[49] Specific recommendations included interoperability of information systems among various government and private health agencies, expansion of existing telehealth programs and EHR capabilities, and a general effort for increasing capacity, reliability, interoperability, and safety when using eHealth technologies. These recommendations described in detail how wireless health technologies might be implemented and used throughout the industry.

Granted, this wireless scope went beyond the focus of online email communication through secured health portals, but it opened the door for even more advanced forms of communication through the electronic messaging service by allowing for mobile devices to transmit information directly from portable monitoring systems worn by patients (such as health monitors or insulin pumps) into the pages of the electronic records (EHRs). In a way, even the transmission of mobile health information could be looked upon as electronic messaging; and, if this information was to be transmitted into patient health records, it had to be done in a secure, private manner that followed all HIPAA regulations.

The activity of the mHealth Task Force continued to become more visible to those who depended upon its endorsements for continued advancements in eHealth communication. It became evident that multiple groups had complemented each other in capturing the complex need for reaching a full overhaul of the telecommunication regulations and advanced capabilities in healthcare. Indeed, the answers were not all available. New policies continued to emerge as new standards were desired and new technologies were introduced. The world of mHealth, eHealth, or just plain electronic health communication was indeed here to stay.

The National Telecommunications and Information Administration

Sometimes confused with the FCC, the National Telecommunications and Information Administration (NTIA) was the main federal office involving influential regulations for electronic health. It worked out of the U.S. Department of Commerce. Together, the FCC and NTIA monitored the limited resource of the available federal and nonfederal spectrum for mobile and fixed wireless broadband use. The federal government paid particular attention to how this limited resource was made available for the benefit of advancing technologies throughout the country (in this case, particularly, eHealth technology). The specific purpose of the NTIA was to assure that "America's domestic and international spectrum needs [were] met while making efficient use of this limited resource" (National Telecommunications and Information Administration, 2013).[50]

There was a limited resource of "space" for wireless networks to send signals. Because of the digitization of many radio and television networks, some "whitespace," or unused bands of spectrum remained available. The careful monitoring of this space was the job of the FCC and NTIA, with the NTIA being the main federal regulatory department for the safe management and control of this limited availability. The surge toward digital health and its growing influence on the national healthcare system through the HITECH Act indeed empowered the NTIA as well as the FCC with a job that truly controlled the potential direction of healthcare technology.

The American Recovery and Reinvestment Act of 2009 provided specific money set aside for the use of two critical programs overseen by the NTIA: The first was the $4.7 billion Broadband Technology Opportunities Program, which allowed for the development and expansion of broadband services to rural and underserved areas as well as for the improvement of broadband access for public safety agencies. The second was a $650 million allotment for TV Converter Box Coupon Program, which was a way for members of the general public to afford and encourage the transition from analog to digital television transmission (National Telecommunications and Information Administration, 2013). The latter program only served to reemphasize the widespread scope of the technological transition from analog to digital systems that would inevitably advance the overall technology of the American household. The former program, of course, was where much of the money was coming from for the HITECH Act's expansion of eHealth technology.

The Interrelational Factor

When looking back at these coexisting policies and social programs, it became obvious that the climate was ripe for the HITECH Act of 2009 to be introduced into the American system. Granted economic woes, changes in political parties, and a multitude of other factors worked hand in hand with the emergence of each of these programs. However, in the end, technology sped ahead while keen economists, program developers, governmental officials, and healthcare officials realized that it was only a matter of time before the interlocking programs would meet this challenge head on. Could the United States have been better prepared? No doubt a prophetic eye may have done a better job. Good or bad, the state of affairs was ripe for change: Technology went digital and wireless; a mobile economy launched into smartphones and instantaneous forms of messaging; a seriously inefficient, overtaxed healthcare system suffered from vast overspending, unnecessary repetitive testing and screenings, and insurance reimbursement issues; and the general public demanded to be at the center of its own health with choice of access and liberty to communicate through multiple communication channels. Much was in a state of flux. Technology itself seemed to initiate an explosive transition into not only a HITECH Act but an entirely new way of communicating with one's physician and, for that matter, the U.S. healthcare system at large.

Media and the Medium Perspective

The notion that technology existed as the primary mechanism for and response to change implies no coincidental relationship. As policies for online privacy, programs for increased rural broadband access, and governmental mandates for EHRs all culminated with the HITECH Act of 2009, technology seemed to both cause and react to the unsettling environment of healthcare reform. As electronic messaging became introduced as an acceptable, common means for communicating with physicians, the need for mandated secured portals existed not only for privacy reasons but for the newfound opportunity to "speak" to a physician on demand, at any time of the day or night. Instant record-keeping of these messages in electronic charts could be accessed by physicians and patients alike through shared electronic portals that at any given moment could simultaneously be viewed by the physician in the office, the hospital emergency room physician, and the emergency medical technicians (EMTs) as they hurry an ambulance down the highway in transit to the hospital. Even as these charts themselves were accessible by each party, they also could be communicated *about* through the process of electronic messaging within EHR portals. Indeed, the technology emerged as the medium through which the public viewed "Obamacare," not so much because of insurance reforms and affordable care but because the medium through which their communication was transmitted somehow caused the entire nature of the physician/patient relationships to be different from ever before.

The Medium as a System

In *Understanding Media: The Extensions of Man*, Marshall McLuhan most aptly summarized this contagious, all-encompassing effect of a new technology through an analogy about medicine:

> The new media and technologies by which we amplify and extend ourselves constitute huge collective surgery carried out on the social body with complete disregard for antiseptics. If the operations are needed, the inevitability of infecting the whole system during the operation has to be considered. For in operating on society with a new technology, it is not the incised area that is most affected. The area of impact and incision is numb. It is the entire system that is changed. (1964, p. 64)

The HITECH Act with its requirement of the secured portals, through which EHRs were newly accessed and electronic messaging took place, for the first time became a significant systemic change for medicine affecting all related systems throughout the United States. In fact, once the Stages of Meaningful Use first became implemented, potentially everyone who engaged in the healthcare system could be affected by this system in one way or another.

McLuhan further argued that *how* the message is transferred (i.e., the medium through which it is sent) can have as much influence on the effectiveness and interpretation of that shared message as the words themselves. His often quoted statement, "The medium is the message," infers that the message cannot be interpreted without consideration of the effect of the medium, in this case the electronic message sent through the secured portal.[51] The message could be read on a piece of paper, spoken out loud, or written in an email; but which medium is used affects the interpretation and perceived meaning of that message.

An example may clarify. When a patient says, “I am feeling a bit blue,” out loud, in person, the physician interprets that message based upon context, history, tone of voice, eye contact, facial expression, and body positioning. When a patient says the same in a letter written in a journal, this message is again interpreted based upon the context of the message, past history of written messages, style of handwriting as compared to previous messages, and assumed privacy level of that message (intended or not intended for someone else to read). When those same words are written in an electronic message to the physician within a secured portal that guarantees a response within forty-eight hours, it might be interpreted based upon the exact time of day the message was written, the surrounding information given, the educational level of the text, the medical vocabulary used or not used, the assumption that someone else who has access to the patient user name and password might see this message, the fact that it cannot ever be erased (or lost as with paper or denied as with oral communication), and the knowledge that a nurse might obtain this note before the physician (as opposed to an office visit when only the patient and physician are present). Interpreted messages through various mediums may be relatively equivalent or totally different from each other. It all depends upon which factors are attended to when receiving and interpreting the message. The message is the same, but the delivery system or medium may affect the interpretation of that message.

Further, to complicate this issue, patients’ and physicians’ perceptions of using the medium to deliver messages also affect how they transmit and interpret those messages. For instance, if patients or physicians perceive the medium of the online messaging service to be burdensome, confusing, time consuming, or artificial, they may be less likely to produce an effective message and/or interpret a message in a favorable manner. If the senders perceive the medium as time efficient, money saving, convenient, and accessible, they may be more inclined to use the medium more frequently themselves and respond more favorably to incoming messages as well. The perception of the medium is directly related to how the message within that medium is perceived.

Finally, the medium *is* the message, as McLuhan argued. That is, when physicians or patients first chose to use the electronic service, it said something about them as users: their attitude toward the medium, their overall disposition toward communicating within a medical context the same way they do in personal relationships, their willingness to change, their level of media literacy, and even their basic willingness to communicate at a level most accommodating for the other party. When older physicians, for instance, first converted from paper to electronic charts and actively started using electronic messages with their patients, this action itself conveyed something about them as users. Perhaps younger patients might have perceived these physicians as being up-to-date, open-minded, or willing to meet them at their level. If physicians complained about the use of the medium to their patients and said that they were only using it because they "had to," then their patients might perceive their physicians as not really interested in receiving the online messages or not wanting to be bothered by something that is being forced upon them. This also can be said from the patients' point of view. How physicians first perceived their patients affected whether they felt the patients would want to use the online portal. If the physicians felt their patients were too old, technologically challenged, not interested, or too poor to afford the Internet, the physicians might not have felt as if the effort in transitioning into the secured portal system was even worth it. Or, they may have declined to offer the service to patients based upon their perceived assumptions about their patients' overall desire and willingness to use online messaging. Perceptions, therefore, affected the successful implementation of the secured portals and determined the likelihood of developing online medical relationships.

The climate of change also affected the perception of change. For example, when physicians began using a computer in the examination room prior to the HITECH mandates, the use of this medium might have appeared to be more "cutting edged" than it did when more and more physicians started transitioning. As it became more acceptable in the medical context, the perceptions of the medium and its overall effect on the patient/physician relationship began to change as well. That is, the perception and interpretation of using a computer in the room changed over time as it became more and more acceptable. Perhaps in a sense it soon became so acceptable that it was starting to be expected; and therefore, if a physician does not use the computer in the room, he is considered unskilled or out of date. This is what makes looking at the effect of the medium at this point of transition so informative. Context, climate, expectation, and perception of change all affect the interpretation of the medium as message.

The medium transmits the messages between users, affects how those messages are interpreted, says something about the users' attitude toward the medium itself, and finally, conveys information about the medium's overall effectiveness, usefulness, and relationship-developing nature. The point is that much more than the words exchanged is being "said" when and how physicians and patients communicate online.

Therefore, to study the medium of electronic messaging as an information system even beyond the content of the messages is just as valid and edifying as studying the message itself; and perhaps McLuhan would say that the medium is even more edifying than the content of the message itself. The electronic message as transmitted through the secured portals of the newly mandated EHR systems became a “new” medium through which physicians and patients alike shared in the process of improved health through online dialogues. It became available to and expected by patients while being mandated for physician adoption as part of the requirements of Stage Two Meaningful Use.

McLuhan’s systemic change notion affected the laws, the economy, the healthcare industry, the technological transmission systems, and the relationship between the physicians and patients. Indeed, this transformation marked a period in which the face-to-face, in-office visit became not replaced by but *reenvisioned* as a field of options for how patients participated in their own health through a multitude of communication mechanisms. The medium of electronic messaging forever altered the potential patterns of communication within the evolving physician/patient relationship.

The Medium as a Mechanism of Change

The formation, approval, and implementation of the HITECH Act of 2009 created a social “tipping point”[52] for health reform. This divergent climate was equally influenced by government lawmakers, healthcare providers, consumers, and technological advancements. As earlier discussed, from a technological perspective, the single most influential and transformative change came about with the mandated EHRs, which required secured portals for online electronic records and online communication. There are many ways of assessing the significance of this mechanism of change; however, the attempt herein is to explore how the secured messages that were transmitted through EHR portals began to affect the overall relationship of the physician/patient dyad and the ultimate health of the patient. EHRs provided a secured environment within which the *possibility* of safe online communication could exist. Issues of online security continued to challenge this medium; but the effort to create a safe environment for the shared decision-making unit of the physician/patient dyad was critical to the efficacy of this medium as a fundamental mechanism of change.

Numerous interrelated disciplines have attempted to explore the complex environment surrounding the HITECH Act and its subsequent influence on healthcare today. Many researchers have applied mixed-method approaches in examining the use of electronic messaging within secured medical portals. Many disciplines view this topic from their own unique vantage points, which, combined, allow for a richly layered perspective on this topic. It is important to acknowledge the wide range of methodologies and perspectives that have been used in determining how people viewed and involved this medium of communication within the healthcare context. Herein, a mixed methods approach is applied using both quantitative and qualitative research in exploring how physicians and patients perceived and used electronic health eMessaging within secured health portals. The objective is to capture the multitude of forces at play and to determine to what extent the users were aware of and influenced by these forces. This method is considered particularly effective for use in health services reporting as well as in research involving analysis of complex, multifaceted environments. Each method provides a different angle or lens through which history was observed. The purpose is to provide valid insights of a broad spectrum of EHR users throughout this period of transition.

Specifically, the next chapters use surveys and interviews to explore how perceptions affected usage patterns. Future suggestions for more analytic approaches are also considered including the use of computer-generated content analysis and data mining of actual patient messages as an extended means for examining the intricacies of this medium and its efficaciousness in helping to improve health.

The purpose of the next chapter is to explore how the medium of electronic messages was perceived by physician/patient users and how these messages functioned in influencing the dynamic evolution of the physician/patient relationship in its quest to achieve effective, satisfying health outcomes.

NOTES

1. Also known as the "Stimulus Package" and/or the "Recovery Act."

2. See the National Telecommunications and Information Administration of the United States Department of Commerce (NTIA) for details at http://www.ntia.doc.gov/page/2011/american-recovery-and-reinvestment-act-2009. (National Telecommunications and Information Administration, 2013).

3. The term "medical communication" is used throughout this book to distinguish itself from "health communication." The former, coined by E. Phillips Polack, MD in *Applied Communication for Healthcare Professionals* (2008), refers to "communication between health provider and patient or colleague" (Polack, Richmond, & McCroskey, 2008, p. 18). The latter is often used as a more general term, including but not limited to the rhetoric of health campaigns and health-related research involving communication(s).

4. See http://www.hhs.gov/ocr/privacy/hipaa/understanding/coveredentities/hitechact.pdf for HITECH Act of 2009. See http://www.hhs.gov/ocr/privacy/hipaa/administrative/enforcementrule/hitechenforcementifr.html for interim changes to the Act.

5. There are two main versions of the Hippocratic Oath. The traditional version was translated from the Greek by Ludwig Edelstein (*The Hippocratic Oath: Text, Translation, and Interpretation*. Baltimore: Johns Hopkins Press, 1943); and the modern version was written in 1964 by Louis Lasagna, Academic Dean of the School of Medicine at Tufts University. Typically, the latter is used in medical schools today.

6. The choice of using “mediums” in its plural form is purposeful. The usage implies a media ecology perspective in that the “medium” is a form of media or mechanism through which a message is transmitted. During the transmission, the message derives meaning not only from the verbal and/or nonverbal message itself but from the medium through which the message is delivered. Very basically, for instance, the words “I love you” may sound very different and in fact mean a very different message when said over a loudspeaker than over a telephone or through a text message or email. The medium itself affects the meaning and the interpretation of the message conveyed. That being said, “media” is of course the true plural form for many “mediums” and will be used as such when the clarification between “a mode of transmission” and a public media form (such as the nightly news) needs to be distinguished.

7. Although this oath is not directly tied to any one government policy, it does reflect the ongoing promise that all medical care directly or indirectly delivered through physician/patient communication must adhere to standards that respect the rights and privacy of the patient and must assure all possible and reasonable means of helping that patient. Certainly, when the Hippocratic Oath was first written, the notion of electronic messaging was nonexistent. However, evident of the timelessness of this oath, the idea that whatever is shared with a physician must stay within the boundaries of that relationship is particularly relevant to the online interactions and security issues of today. For this very reason, this segment begins with this most fundamental “law” of medicine.

8. For a copy of the HIPAA Act of 1996, go to https://www.cms.gov/Regulations-and-Guidance/HIPAA-Administrative-Simplification/HIPAAGenInfo/downloads/HIPAALaw.pdf.

9. For a copy of this original document, go to http://www.irs.gov/pub/irs-regs/td8931.pdf.

10. For more information, go to http://www.ask.com/wiki/Public_Health_Service_Act?o=2761&qsrc=999.

11. The focus on security here is not meant to imply that this topic is the only standard of care discussed in the Hippocratic Oath. Privacy and security are, however, key for HIPAA, though healthcare efficiency and simplification of healthcare insurance procedures are also central. Even so, both the oath and the policy contain a wealth of related standards for patient care. Again, there is no intention here of saying that the two are equal, only related in how they governed patient health standards.

12. See the full PDF version at http://www.gpo.gov/fdsys/pkg/FR-2008-11-21/pdf/E8-27475.pdf.

13. For detailed accreditation requirements for individual medical programs, see http://www.acgme.org/acgmeweb/.

14. To exemplify this process, it is to be noted that several presentations had been made by this author on multiple occasions on this topic for CME for physicians and ancillary professionals. “Maintaining Patient Confidentiality and Security in an On-Line World” was presented on February 27, 2013, at the thirty-third Annual Conference at the Slopes, Respiratory Care Conference at Seven Springs Mountain Resort, Champion, Pennsylvania, for the Cambria-Somerset Council for Education of Health Professionals Incorporated (academic service). Also, “Professionalism in an On-Line

World" was presented on June 23, 2013, as Basic (Medical) Humanities Education (BHE) for the Department of Surgery, West Virginia University. Each of these talks discussed the relationship between medical communication, safety, and policy; and each provided CME credits for those physicians taking the course as approved by the AMA.

15. See http://www.washingtonpost.com/wp-dyn/content/story/2009/02/13/ST2009021302017.html in Washington Post (Murray & Kane, 2009).

16. See http://www.hipaasurvivalguide.com/hitech-act-text.php for the Table of Contents and a direct link to the HITECH Act of 2009,

17. At the West Virginia Chapter of the American College of Surgeons' annual conference on May 5, 2009, information regarding the importance of the IOM's push for multimediated interactions between physicians and patients was presented by this author in a talk, "Physician/Patient Email: A SocioInformatics Perspective." With the new implementation of the HITECH Act already in play, several physicians in the audience reacted negatively at the time to the perspective of patient rights for online communication with physicians. In subsequent talks, however, the climate became more favorable, suggesting gradual acceptance by physicians of the changing patient expectations of electronic messaging and EHRs.

18. For further examination of the IOM, see their website at http://www.iom.edu/About-IOM.aspx.

19. See www.hhs.gov for all references to health-related documentation from the Health and Human Services website.

20. The full bill may be located at http://www.govtrack.us/congress/bills/113/hr2590/text.

21. See http://www.healthit.gov/providers-professionals/ehr-interoperability for further details and applicable links.

22. For details of this program, it may be helpful to see the following link: http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/index.html?redirect=/ehrincentiveprograms/.

23. These programs are sometimes referred to together as the "Medicare and Medicaid EHR Incentive Program Registration and Attestation System."

24. The following link may be used for details concerning this program of "stages": http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/index.html?redirect=/ehrincentiveprograms/.

25. See http://www.healthit.gov/policy-researchers-implementers/meaningful-use.

26. Discussion of the communication ramifications of these stages is in chapter one. This summary reflects the huge impact of these stages on provider navigation of the healthcare system. Certainly, the complexity alone of this system forced many to spend significant funds not only on new EHR systems but on staff and advisors who could assure that the requirements were met to avoid penalties.

27. According to medpage.com, the 2013 Deloitte Survey of U.S. Physicians found that 62% of tested physicians stated that their colleagues will retire earlier than planned in order to miss the Meaningful Use penalties. Others will reduce their work hours or simply go into a related field that does not see patients (Pittman, 2013). For the original Deloitte Survey, the following link may be helpful: http://www.delo

itte.com/view/en_US/us/Insights/centers/center-for-health-solutions/a5ee019120e6d310VgnVCM1000003256f70aRCRD.htm#.

28. It may be noted that this author's personal experience in managing a private family practice office for a solo physician at the time reached costs exceeding $75,000 alone for computer equipment, software, setup, and a server. Monthly rates for software maintenance, billing, training, and computer "fees" averaged over $700 per month. Implementation of a secured portal and other associated fees working toward Stage Two Meaningful Use attestation climbed to well over an additional $5,000 in the first year; and this did not include the costs of additional employee training and salaries. Although this may not have been considered "typical" to all physicians' offices, it did represent one rural physician example of costs when trying to meet Meaningful Use criteria while using one of the key national EHR systems, Allscripts.

29. The magnitude of the number and cost of the vendor switching is having an immeasurable effect on the economy of healthcare. A Black Book Rankings release sited in iHealthBeat, February 19, 2013, stated that a Black Book Rankings release from February 18, 2013, showed that of the 17,000 medical practices surveyed, 80% said their current EHR system did not meet their needs; 79% said they did not adequately assess their own needs before selecting an EHR vendor; 77% said the design of their EHR system is not suited for their practice's specialties; 44% said their EHR vendor was unresponsive to their needs and requests; and 20% said their EHR system did not adequately communicate with other EHRs (EHR Users Consider Switching Vendors in 2013, Report Finds, 2013).

30. See http://www.rwjf.org/content/dam/farm/reports/reports/2013/rwjf406758 for full report from the Robert Wood Johnson Foundation.

31. Oddly, no one articulated (at least not in writing) the fact that the entire amount of money set aside to implement the HITECH Act ($19.2 billion) was nearly spent at this time. If the allotment no longer existed, how would the government distribute these incentives? Perhaps some felt that this funding would not matter since fewer and fewer met the requirements necessary for the next stage. It was thought that once the incentive period passed, the government would be charging penalties, which possibly might afford some reimbursement of the already-paid-out funds for Meaningful Use. The answer at this time was not known. One could only surmise the impact of this entire incentive program on the national healthcare economy.

32. Note that many of these usage patterns were part of the Stage Two Meaningful Use requirements, indicating that these physician practices were ready for attestation. For a summary of this article, see http://www.ihealthbeat.org/picture-of-health/2013/what-percentage-of-physicians-with-ehealth-records-are-using-certain-functions.

33. In October 2013, Mostashari stepped down from his position, followed by Lisa Lewis, who was acting coordinator in 2014 for a five-month period. By 2015, Robert M. Koloder, MD, was the national coordinator.

34. This report also references an ONC study directed by the National Center for Health Statistics' 2009–2012 National Electronic Health Record Surveys and reveals a significant difference between 2009 and 2012 percentage of physicians with computerized capabilities for meeting Meaningful Use. These statistics are also cited in iHealthBeat's report on August 14, 2013, and may be found at http://www.ihealthbe

at.org/picture-of-health/2013/what-percentage-of-physicians-were-using-computerized-capabilities-to-meet-selected-meaningful-use. The higher figures reported in the oral testimony, however, do not mention a specific source. Only the ones between 2009 and 2012 are referenced. When figures are so much higher and no citations are given, then questions arise regarding the credibility of the source.

35. For the full testimony, see http://www.hhs.g/asl/testify/2013/07/t20130717b.html.

36. "Affordable care" is later discussed. Reference to money has been made in light of the overall costs of implementation and government incentives.

37. It is noteworthy to mention that in a discussion with West Virginia University Surgical Residents (June 2013) about these Stages of Meaningful Use, the first-year residents did not know to what I was referring. If the residents who were relatively new physicians working within the field were not familiar with these stages, how could one expect the patients who were even less directly affected by them know anything about this?

38. A personal experience may clarify: As Office Manager of my husband's family practice and geriatrics office, I witnessed firsthand the transition into EHRs. At the age of 55, my husband, J. Eric Wieczorek, MD, had to learn for the first time to use a computer and even to type. The learning curve was significant and affected how he communicated with his patients due to the added presence of a laptop that he did not know very well how to use. Often he discussed his frustrations with his own learning process, the difficulty he had trying to look at patients while navigating the EHR, and the overall feeling of entering an unknown medium that was forced upon him in order to meet government requirements with which he did not necessarily agree. He readily complained to his staff and to me that it made his time with the patient less meaningful, more stressful, and quite frustrating for both parties. One thing that amazed him, however, was that the patients appeared to be understanding. He told me that they would say such things as, "I'm not too good at that new-fangled stuff either, Doc. Better you than me!" In a way, empathic statements such as these were indeed means not only for helping the physician get through the process but for the patients to accept the presence of a new medium between them and the physician. See chapter 3 for additional examples.

39. It is particularly important to stress that throughout this discussion of the stages' effect on patient communication, this was by no means reflective of all the implications, nuances, or even influences on patients at every phase. These were only the items that this author believes were most important in light of the basic information patients should have had on the stages in order to appreciate and become more involved in the process.

40. It is likely that the significance of this one factor was the single most important communication change in the face of medicine since the telephone. See also chapter 2.

41. For a simplified list of these Stage Three predictions, go to HealthIT.gov at http://www.healthit.gov/policy-researchers-implementers/meaningful-use.

42. For the full text of the Patient Protection and Accountable Care Act (Public Law 111-148) as signed on March 23, 2010, see http://www.gpo.gov/fdsys/pkg/PLAW-111publ148/pdf/PLAW-111publ148.pdf (111th Congress, 2010).

43. See the Reconciliation Act (Public Law 111-152) as signed into law on March 30, 2010 at http://www.gpo.gov/fdsys/pkg/PLAW-111publ152/pdf/PLAW-111publ152.pdf (111th Congress, 2010).

44. Each of these sections was more fully explained in the link, https://www.healthcare.gov/timeline-of-the-health-care-law/ from the U.S. Centers for Medicare & Medicaid Services website. This abbreviated listing is only meant to show the necessary scope of this law, not to provide a detailed explanation of each segment of the law.

45. For a wealth of additional information, see http://www.hhs.gov/healthcare/rights/index.html.

46. For a complete text of the FCC Telecommunications Act, go to http://transition.fcc.gov/Reports/tcom1996.txt.

47. In 2010, an analysis of the related 2007 Rural Health Broadband Initiative was made in an effort to examine how the broadband funds were distributed, the implementation process, and the overall effectiveness of this program (Whitten, Holtz, Krupinski, & Alverson, 2010).

48. A "Fact Sheet" is available from the FCC that reviews the specifics of the Healthcare Connect Fund and other related FCC programs. See http://www.fcc.gov/document/healthcare-connect-fund-fact-sheet.

49. For the PDF document reported by the mHealth Task Force on September 12, 2012, see http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-316435A1.pdf.

50. For helpful information on the spectrum management of NTIA, see http://www.ntia.doc.gov/category/spectrum-management. For the Congressional Research Service report dated May 28, 2013 (Moore, 2013), see http://www.acuta.org/wcm/acuta/legreg/061813a.pdf.

51. Joshua Meyrowitz referred to this notion as "medium theory," which he explained pays particular attention to those unique characteristics that distinguish one medium or one type of media from another (Meyrowitz, *No Sense of Place: The Impact of Electronic Medium on Social Behavior,* 1985).

52. The concept of "The Tipping Point" surged into popular use with Malcolm Gladwell's book by the same name (2002). Gladwell stated that such a circumstance surfaces when three characteristics exist: "one, contagiousness; two, the fact that little causes can have big effects; and three, that change happens not gradually but at one dramatic moment" (p. 9).

Chapter 3

The Medicological Environment

Multiple converging perspectives created and influenced the complex, conceptual environment surrounding electronic health communication before and during the HITECH Act implementation phase. Patterns of adaptive change surfaced and resurfaced as electronic messages shared between and among medical professionals and patients influenced an interlocking public response from these participants. The new government mandates for meeting Stages of Meaningful Use[1] thrust users forward into the unchartered space of electronic communication while more and more responses emerged from the public, the professionals, and a wide variety of related disciplines who also found themselves engaged—willingly or not—within this space. Contributions from the fields of technology, medicine, psychology, law, sociology, media, and communication alike created a composite reality much more complex and far-reaching than what was studied separately in each individual discipline.

This sort of gestalt phenomenon, whose context represents an environment much greater, more complex than its component parts, might best be called a "medicological environment."[2] Combining the term "medicological" with "environment" suggests a new space, a system that includes the public and professional worlds with the ever-present legal/political influences that existed within society at this particular time.[3] Likewise, the "*co*" in the word medi*co*logical is intended to suggest the field of *co*mmunication and not the medi*cal* field only. Medicine and Communication intertwine to create a space within which health, education, sociology, psychology, philosophy, and virtually all disciplines and professions create an effect on how patients and practitioners perceive and interact within this environment. Both are active participants who bring to the table a wide range of past experiences that have influenced their perceptions of and behavior within all subsequent engagement inside the medicological environment.[4] Driven by medicine yet affecting and being affected by the public socioeconomic and political response, this environment demands the attention of not only varied disciplines but varied observational methods of "hard" science, social science, and philosophy alike. By combining the research of these fields and welcoming their contributions through mixed methodologies, a richer, more informed perspective emerges from this evolving environment. In short, the medicological environment exists as a complex, open, dynamic phenomenon of interlocking forces that influence public and private sector response to electronic health communication between and among physicians, providers, and patients who share the common denominator of electronic medical communication.

In a sense this environment might be viewed as its own ecosystem that constantly works toward balancing the various internal influences (advances in medical science, patient safety needs, etc.) while reacting to external factors (social change, politics, disease) that continue to challenge the overall balance of the system itself. The boundaries of this environment are blurred, ever responding to adjoining systems or "habitats" that affect change by exerting a continuous flow of energy (positive or negative) into the system from outside the medicological environment. Like any true ecosystem, this environment contains producers (healthcare workers, researchers, physicians, medical societies), consumers (the public), and decomposers that help to recycle, reformulate, or alter the information within the system (check and balance systems such as medical societies and hospital ethics boards). The health of this system depends upon the ongoing cycle of energy or information that sustains the environment and enables it to continue to produce patient care that is effective enough to maintain the health of its members at the level and quality that the system itself determines is sufficient to sustain life. The goal of this medicological environment is to nourish the life of those who are served (the patients) through the help of those who are serving (the physician and healthcare team). The roles of each may at times switch or be played simultaneously by the same person (as when the physician becomes the patient or the patient provides information for the physician to use in improving health). Outside factors affect the boundaries of this system (such as government mandates or technological advancements) because it is in fact an open system. However, this dynamic environment continuously works toward a state of equilibrium that is driven constantly forward in an effort to provide adequate, sustaining care of its members.

Furthermore, anytime this environment is observed or discussed from this vantage point, a "medicological perspective" is taken. That is, this space is a complex, interactive, ever-evolving environment that warrants continued study not only from individual disciplinary perspectives but from *inter*disciplinary perspectives that may even seem at times unrelated or mutually exclusive. In a general sense, for instance, rhetoric and science are studied together as "the rhetoric of science," and yet the two fields of study often vary in their means of viewing and interpreting the same environment. Science typically focuses on the scientific method of observation in which conclusions are drawn based upon a controlled examination of variables. Rhetoric tends to view the environment through textual and contextual analyses; verbal and nonverbal usage and argument; and broader communication perspectives of observation. Both fields have attempted to coordinate their perspectives in drawing conclusions about their observations, but this has occurred with ongoing philosophical disparities about the strength and effectiveness of observational methods used and conclusions drawn (based upon these contrasting methodologies). It is therefore argued here that these varied perspectives are relatively equal in importance and contribution to the many perspectives necessarily taken when studying the medicological environment.

As earlier stated, the HITECH portion of the American Recovery and Reinvestment Act of 2009 stood as the visible impetus of a transition that filtered throughout society slowly yet purposefully toward reform. The political laws for the Stages of Meaningful Use required that all physicians provide the opportunity for patients to communicate with them online within a secured portal provided by their private office or health institution. Early on many physicians resisted the change, many asked for extensions by stating such a transition was too much of a "hardship,"[5] and many argued that the laws were too stringent, harming not only the economic functionality of their practices but the very essence of the physician/patient relationship typically characterized by face-to-face visits and records owned and viewed only by the physician. Some complained too that the limited commodity of time was sacrificed by the constant presence of online messages which could interrupt the critical, more urgent demands of day-to-day medical care. Still others, the patients, weighed in on the realization that all this altered their own perceptions, expectations, and newfound needs when navigating the evolving healthcare system.

Certainly, many resisted the change; yet many embraced it as well. This chapter examines the unfolding effects of electronic health messaging by discussing three interrelated ways in which groups affected by this change responded in an effort, perhaps, to adapt to and learn from this new medium for communicating about health: (1) the sociotechnological response, (2) the physician response, and (3) the patient response.

In so doing, this health-focused environment—within which the medical, psychological, legal, social, and technological influences played a part—helped define this system of change. Multiple interlocking perspectives affected the discourse and action of the participants within this evolving medicological environment.

THE EVOLVING SOCIOTECHNOLOGICAL RESPONSE[6]

From the launching of the Soviet Union's Sputnik 1 in 1957, to the beginnings of the Advanced Research Projects Agency Networks (ARPAnet) funded by the U.S. military after the Cold War, to computer engineer Ray Tomlinson's "first" electronic mails between his own computers in 1971, the expansive popularity of the Internet's electronic messaging capability significantly altered the face of communication within and between information systems and organizations. It started as an intriguing phenomenon, a novelty for high-tech users, and ended up as a central part of society's day-to-day environment.

Everything from emailing, to texting, to Facebook, to Twitter involved socially networked exchanges of messages that were transmitted through the same mechanism: the computer. The smartphone became a computer and the computer became a phone;[7] and through all these media exchanges, society transmitted messages from person to person through these computer screens of various sorts with the very basic desire to exchange information. This indeed was a far cry from Ray Tomlinson's first email, but it showed how explosively the advancement of technology could alter the face of communication patterns throughout society. Even the idea of "New New Media," as introduced by Paul Levinson in his books by the same name (2009, 2013), suggested that multipurpose, overlapping media formats existed with fewer and fewer unique characteristics, limitations, and technologies. Converging media afforded communication diversity almost unimaginable in the day of Tomlinson. Nevertheless, such change existed and continued to take form.

Medicine was no different. It just stepped forward a little more cautiously. Indeed electronic messaging, particularly, email, was not a "new" medium by current standards, but its use and application in a field which prided itself on face-to-face communication, physical examinations, and mandatory office visits presented challenges and concerns from not only a practical point of view but a financial, legal, and efficacy standpoint as well.[8]

Many have examined how media itself has transformed society. Marshall McLuhan's notion of the "Global Village" (1964) seemed almost prophetic as multimedia health channels such as personal digital assistants (PDAs), EHRs, secured patient portals, and tele-visits ("eVisits")[9] flourished, promising travel not only across local, state, and national lines but across continents as well.[10] Though often upstaged by these and other telemedical technologies, the use of electronic messaging between physicians and patients had systematically and culturally transformed the private, time-controlled space of this fundamental relationship.

This segment examines electronic messaging (basically emails) within secured portals as a social instrument of change as developed over time in the physician/patient relationship, from the perspective of media ecologists including Marshall McLuhan (1964, 1962), Lewis Mumford (1934), Joshua Meyrowitz (1985), Carolyn Marvin (1988), and Elizabeth L. Eisenstein (2005). When this perspective of the medium itself is combined with existing medical publications, news articles, and interdisciplinary research studies, the effects of electronic messaging on past, present, and future trends in healthcare become evident in the creation of this medicological environment.

Electronics Messages as a Medical Communication Phenomenon

According to the American Medical Informatics Association (AMIA)'s first established guidelines for physician/patient online communication in a 1998 whitepaper (Kane & Sands), the electronic message (at the time only including email)[11] was a hybrid between letter writing and the spoken word with the spontaneity of oral expression and the permanence of written documentation. The first AMIA guidelines defined patient/provider electronic mail as "computer-based communication between clinicians and patients within a contractual relationship in which the health care provider has taken on an explicit measure of responsibility for the client's care" (Kane & Sands, 1998, para. 4).[12] This did not include noncontractual relationships, basic online discussion groups, or public forums. This did, however, include all medical advice, treatment, and information exchanged professionally between physicians and their patients through electronic interactions. These used encrypted or unencrypted messages that were transmitted online or through text messaging on cell phones.[13]

Evident in this definition is the importance of time, permanence, and control within the online physician/patient relationship. Like the spoken word, the electronic message allowed for a free-flowing, present-based, natural means of communication. It encouraged immediate expression of thought without regard for the time of day or the physical presence of the receiver. Its spontaneity was both its benefit and its danger; for a person might have written a note in a moment of anger, trauma, or sentiment and then sent that expression without ever being able to "take it back." Words indeed could be spoken in the heat of emotion; and, because of their closeness to the unguarded, natural experience itself, such expression in fact could be more revealing than the more rehearsed words of a written speech or letter. Physicians who received such a note gained firsthand insight into their patients' mental state in the midst of a problem—something that rarely happened in the often artificial and sterile environment of an office visit. Too often patients *recalled* their emotion but did not record it *as* it was experienced, a much more valid observation. Therefore, the spontaneity of the electronic message had the potential of capturing patients' experiences in a more primary and direct manner than formally prepared messages.[14] Granted not all electronic messages were delivered in such a stream of consciousness state, but they did in fact have the *potential* of being created and transmitted in this manner. It is this very characteristic that made this medium similar to the spoken word. In contrast with speech, however, the electronic message captured in writing a patient's thought process at any time of day no matter if the receiver was available for response or not. Physicians did not have to be in their offices or "on call" to hear the patients' tone of voice in the midst of the experience.[15] Messages were relayed without the mutual physical presence of an office visit. Time and even place were not factors. The electronic messages, therefore, allowed for unrehearsed, imperfect, natural, introspective, emotional, and spontaneous thoughts to be captured as they were experienced.

Once words were spoken, they could be forgotten, vaguely recalled, or remembered differently by each involved party. Once words were sent through electronic messages, however, they were recorded word for word. They could never be taken back. They remained forever retrievable in cyberspace (or in the electronic chart of the secured portal). In contrast, because of its dependence on human memory, oral conversation remained relatively transient. It depended upon the practitioners' memory and transcription for the actual recording on a chart (electronic or paper) of the information spoken. There was always the possibility that the message would be inaudible, misinterpreted, or inaccurately transcribed. Patients in their physicians' offices could be asked questions that forced them to recall what they had felt at a specific point in their history. Presumably, if the electronic message were sent at the time of the felt experience, then the description might have been more primary (to the source of the experience) as opposed to being clouded by memory when the physician elicited recalled information. The spoken word depended upon the ability of the patient to remember the emotion or event and upon the physician to record that description accurately in his or her own words. Electronic messages were always word for word and entered the medical chart as such. Oral messages required accurate listening, interpretation, and transcription of what the patient said. They could be retyped or revised as they were written, but once they were "sent," they were irretrievable.

Uniquely, electronic messages could be as spontaneous as the spoken word yet even more permanent than the written word in hard copy form. Once the "send" button was pushed, electronic messages could be saved not only in an electronic folder but copied and saved in a paper chart as well.[16] They instantly became part of the permanent medical record of the patients' mental and emotional state and medical condition at the time of delivery.[17] No matter how formal or informal, how intentional or unintentional, the electronic message captured the patients' personal experiences and transformed them into a legal document whether or not it was forwarded to the paper or electronic chart (Spielberg, 1999; Terry, 2001). Whether electronic messages existed in hard copy and/or somewhere in cyberspace, they were permanently retrievable and virtually indestructible. Letters could be lost in the mail, burned in a fire, or ruined in a flood, but electronic messages were never really destroyed. In this sense, they were even more permanent and protected than paper messages.[18]

To fully appreciate the ramifications of these traits, the security and privacy standards surrounding transmission and recording of electronic messages must be considered. Ultimately those who created and sent electronic messages were responsible for the content and format in which the information was sent. They may have cathartically released an emotional message, toned it down, revised it, or simply deleted it without ever conveying it in its original form. Once sent, however, the messages became part of the patients' permanent medical history.[19] The patients had the right to review or get a copy of the recorded data, but they could not actually remove it. Even if there were a court order for the elimination of the information recorded on the electronic medical chart (say for insurance reasons), it still technically was "there" because it potentially still could be retrieved from the "recycle bin." These deleted files were never totally removed from the computer. There were companies emerging more and more who were devoted to retrieving such files often for legal purposes; therefore, no message was ever really lost.

Ancillary staff members including office secretaries, nurses, and partners within physician groups still had access to the recorded information like how they did with any medical, hard-copied chart. Similarly, with hard or electronic charted messages, all had the ethical and legal responsibility to maintain patient privacy and to not forward such information either inadvertently or purposefully to any other parties except for the patients themselves or medical professionals directly involved in the care of that patient. Likewise, mere retrieval of such PHI without the permission of the patient or a direct requirement of the healthcare position was a direct violation of patient privacy.

As discussed earlier, the HIPAA laws intentionally regulated the security of all electronic and written messages about patient health. Security of electronic messages due to their accessibility and permanence indeed was (and is) a serious issue. Both those who created the message and those who had access to this transmission, therefore, had to realize the inherent responsibility of viewing, sharing, and using this information. Responsibility for maintaining secure, protected information exchanges, therefore, lay in both the sender and the receiver of the message as well as with anyone who had access to the original electronic message or medical chart.[20]

In short, the spontaneity, permanence, and information power characterizing electronic messages between physicians and patients played a significant role in the decision of whether to use them as part of each medical relationship. Patients had the choice as to whether or not they wished to utilize this medium. Physicians, on the other hand, had to respond online to the patients as part of the requirements of Stage Two Meaningful Use. As Meyrowitz (1985, p. 9) states, "The widespread use of electronic media has played an important part in many recent social developments" and "the structure of interpersonal behavior." This medium allowed for interpersonal interactions; but the real issue was how these interactions had changed over time and to what extent this change had affected the physician/patient relationship.

The Pivotal Role of Electronic Messages in Medical History

Presumably, ideal communication between physicians and patients occurs best in a person with all senses fully engaged. Yet, upon scanning the more recent medical past, this assumption had not always prevailed. In fact, current developments in technology such as the electronic messages in some ways paralleled past introductions of other "new" trends including the telegraph or the telephone. As McLuhan (1964) argues, the arrival of technology allowed people to extend themselves by creating a sort of "live model of the central nervous system itself" (p. 43). Early on, instruments or "media" became extensions of the physicians' ability to interact with their patients. McLuhan adds that "the tasks of conscious awareness and order are transferred to the physical life of man, so that for the first time he has become aware of technology as an extension of his physical body" (p. 47). Intriguingly the telegraph, telephone, and electronic message all acted as physical bridges between physicians and patients, affording increased access, personal interaction, and care.

A brief overview of recent medical history sheds further light on how media altered the perceptions of this physical relationship between physicians and patients over time. Early American physicians practiced medicine mainly through face-to-face interactions by making house calls or having patients come into town for help. At times, they occasionally communicated through mail if the case did not require urgent care or if the distance between the two warranted it.[21] Contact through postal mail was better than no contact at all. By the seventeenth and eighteenth centuries, surprisingly, "physicians valued patient's descriptions of their illness above a physical examination when making medical diagnoses" (Spielberg, 1999, p. 267). The written word was considered more formal, more thought out, easier to recover verbatim, and more private. It was thought that people were more likely to say what they meant and felt if they could write it down, revise it, and spend time pondering their messages prior to sending them to their physicians. Physical contact continued but was not viewed as the preferred method of interaction. Later, by the mid- to late 1800s, as physical evidence for accurate diagnoses and more scientific methodologies became acceptable, physicians again preferred home visits over written interactions. Only secondary consults were made by telegraph, which reduced transportation time and insured continued patient care through follow-up messages. The telegraph replaced the letter especially in the case of more urgent care. However, privacy issues came into question due to the need for telegraph personnel to encode and decode the messages. Patients chose to use this medium with this consideration in mind.

By the late 1870s, the popularization of the telephone reduced the need for using the telegraph or tracking down the "peripatetic practitioner on foot" (Starr, 1982, p. 69). By taking calls from their homes, physicians minimized time-consuming home visits, postal service delays, or less private telegraphic messaging. Despite some concern over party line interference and security issues, by the mid-1960s the telephone became a widely used medium that substituted for routine appointments, reduced return visits by people from remote areas, allowed for direct patient contact throughout the day or night, and facilitated emergency care (Morach, 2000; Spielberg, 1999). Any suspicions of the telephone as a threatening or dangerous medium that invaded physician privacy or eliminated the need for face-to-face contact were, therefore, quickly replaced by a level of confidence in its benefits. The telephone's ability to bring physicians into the patients' home at a moment's notice for private and immediate consult far outweighed any security concerns.

From a media standpoint, the relationships between medical use of the electronic message and older forms of media such as the telegraph are remarkable. In fact, they echo fears as far back as the popularization of print media and popular medical textbooks. As Carolyn Marvin in *When Old Technologies Were New* (1988) states, such information distribution and media change "provided opportunities for the wrong people to be too familiar" (p. 88) with physicians being among those who were most indignant concerning the "abuse" of medical information being in the hands of the untrained, uneducated lay public. Open distribution of this specialized information brought concern to the medical profession.

Even more recently, this notion continued with some physicians fearing that patients who have access to online resources from PubMed to WebMD have no ability to comprehend the complexity of this information and should therefore not bring it in as evidence in the medical examination room.[22] In a way the objections to print and then to online medical information were the same. They reflected an attitude by some physicians—past and present—that the profession belonged to those who had formally studied it without help from the patient who did not. Marvin's "wrong people" with information in this case are the patients and the “right people” are the physicians who are supposedly the only one’s privy to owning power over this information by knowing whether or not it is accurate and how it should be applied. The olden days of print media compared to the modern days of electronic media provide excellent examples of how even accurate information presented through a new medium could be cause for alarm. The accessibility of professional information in print or online was only for the eyes of those who studied (and therefore controlled) that information. The cases were quite similar; the media itself was what changed. The fear was that information would land in the hands of the wrong people who were not capable of properly deciphering what was accurate or not.

Once physicians adapted to the presence of print media in the hands of patients, this did not seem to be as great a concern. It could be assumed that the same would eventually hold true for the electronic medical resources as well—especially when one considers the introduction of EHRs, which not only provided general medical information but also recorded specific patient information as well. In effect, it was the medium (print vs. electronic) that created the argument for or against the sharing of information within that medium. Once physicians became used to patients having access to medical texts, they did not seem to be as concerned. Likewise, over time, increasingly more physicians became accustomed to patients bringing in materials from the Internet and viewing their medical results online. Again, the concern may have resulted more from the newness of the medium in its ability to transmit information more readily than from the information itself.[23]

Others comment on this same concept. Marshall McLuhan in *The Gutenberg Galaxy* (1962) speaks of the “typographical man” in suggesting that the creation of print had social consequences which caused people to seek information not only from those of authority such as physicians but from the printed text as well (pp. 79, 141, 269). Elizabeth L. Eisenstein in *The Printing Revolution in Early Modern Europe* (2005) reinforces this notion when she discusses how the printing press increased the educational information available to the lay population. Although there was a fear that the oral recitation and sharing of information, in this case between the practitioner and the patient, would be challenged by the popularization of print, the need for consultation and oral education between the physician and patient indeed did not diminish (pp. 102–103, 297).

Over time, as WebMD and Medscape increased in popularity and acceptance, some physicians encouraged patient education through their own office or hospital websites which provided access to controlled information relating to individual patients’ particular illnesses. In fact, as patient portals had become mandated through the Stages of Meaningful Use, more and more systems provided this information automatically through direct emails to the patients.[24] Other physicians actively exchanged medical information through electronic messaging by forwarding articles and websites relating to patients' individual illnesses, treatments, or general medical histories. This use of the electronic messages containing web-based information resembled that of the book but outweighed its effectiveness due to a more rapid and widely spread transmission of information that reflected more current news and research discoveries. Much that was accessible online was not yet available in print. Therefore, the potential speed, efficiency, and state-of-the-art quality of the information transmitted through electronic messaging by the physician had the potential for allowing for well-informed, up-to-date patient educational practice. This enabled the physician to act as a personal *resource* of medical information in *guiding* the patient toward authentic web pages and refereed professional articles. This also allowed physicians to better control the accuracy of the information that became more abundantly available to the public (as many online sources lacked accuracy and credibility). Whatever the case, electronic distribution of medical information and messages had caused the health profession to react in a manner somewhat reflective of the earlier days when print media was first introduced. At first, great caution existed in both cases; but over time and through experience, electronic media for information exchange were starting to be used as regularly and reliably as print media

Historically, the "new" media of the telegraph, telephone, and even print itself had been received by popular culture with similar hesitation. It was no wonder that cautioned acceptance of the electronic message paralleled that fear of other emerging media. As McLuhan states, even the telephone was looked upon as an "irresistible intruder of time and space" (1964, p. 271) as well as "an intensely personal form that ignores all the claims of visual privacy prized by literate man" (pp. 271–272). Indeed, such challenges remained a concern of physicians. Historically, anything "new" anticipates problems. Nevertheless, emails, like print resources, telegraphs, telephones, and most technological advancements, through time did become accepted, adapted, and utilized in ways that strove to meet the needs of society.

Unlike previous forms of new media, full acceptance of electronic messaging within healthcare by physicians and patients alike remained a challenge. Although welcomed in popular culture and even considered "old" technology to some compared to blogs, wikis, search engines, interactive video tutorials, online symptom navigators, and online communities (Rabinowitz, 2008; Palatucci, 2008), many concerns remained with issues of efficacy, privacy, time, malpractice lawsuits, and even job security. Like the fears expressed in Lewis Mumford's *Technics and Civilization* (1934), with the push for Stage Two Meaningful Use behind them, physicians felt almost pressured into using electronic messaging as if by not doing so they would be missing the benefits of the medium or be less responsible to their patients:

> The point is that invention had become a duty, and the desire to use the new marvels of technics, like a child's delighted bewilderment over new toys, was not in the main guided by critical discernment: people agreed that inventions were good, whether or not they actually provided benefits, just as they agreed that child-bearing was good, whether the offspring proved a blessing to society or a nuisance. (p. 53)

As with any incorporation of new media, some physicians perceived the computerized office as a "nuisance" while others embraced the technology and forged ahead, testing the benefits and searching for still newer ways to facilitate optimum patient care. At the same time, some patients did not embrace the use of computerized charts and online communication with their healthcare providers. Some were resistant to the use of any form of electronic communication due to lack of Internet access, finances, technological skill, or basic literacy. Some feared privacy issues.

In all, the introduction of this relatively new medium of communication into the medical community elicited a strong sociotechnological response from its users: both patients and practitioners. The medicological environment remained unsettled as some choose to adopt while others resisted, as some questioned security issues while others argued that if it worked in the banking industry it should work in medicine as well, and as some felt technology would potentially replace direct physician face-to-face access while others believed it would allow for more continuous and accessible care. Although resistance existed, change was inevitable.

PUBLIC RESPONSE TO A CHANGING CLIMATE: THE PRE-HITECH ACT ENVIRONMENT

In order to appreciate the evolution of this medicological environment from pre- to post-HITECH Act (2009), it is first necessary to keep in mind that (1) the basic media available for transmitting electronic information evolved over time and that (2) both the physicians and the patients affected and were mutually affected by these changes. In a sense, this entire transformative climate forced the public to respond to this change—like it or not.

General Public Response Patterns: The Emerging Climate

Indeed, change already was in the making by the early 1990s from a general technological point of view as increases in public use of online communication surged, especially with the implementation of the smartphone: The development of the first smartphone prototype emerged with IBM's "Simon" in 1992.[25] The term "smartphone" itself was coined with the introduction of Ericsson's Penelope GS88 in 1997.[26] The Apple iPhone and the LG Android[27] came into popular play beginning around 2007.[28] From the time smartphones took form until they reached public popularity, a span of a little over 10 years passed; and within this span of time the public technology users *included* both patients and physicians who themselves were general public participants using this medium for day-to-day use. This means that the mechanism for change (i.e., the medium of the smartphone which facilitated increased use of the Internet, texting, Facebook, Twitter, etc.) existed well before the application to healthcare even started. In advance of outside government forces mandating online medical communication, the medicological environment was primed for such change to take place. In a sense, technology drove the use of online medical communication even before the need was realized by the healthcare community and the population at large.

Perhaps one could go so far as to say that the smartphone alone was the single most important medium in this entire process; but that would be an oversimplification. It did introduce continuous communication between the vast majorities of ever-growing users in a wide variety of settings from everyday situations like parents tracking their children's behavior and location to online banking or shopping needs. But to say that the smartphone singlehandedly thrust healthcare into the world of technology would be to disregard the true essence of the medicological environment. The stage may have been set, but the transformative nature of the interlocking factors of social acceptance, legal ramifications, security issues, economic restrictions, and the like all fell into synchronized, parallel play within the medicological environment. The smartphone was a significant factor; but it alone did not propel the acceptance and development of online communication in healthcare today. No, the entire dynamic force erupting within the medicological environment did.

Certainly, the government mandates of the HITECH Act of 2009 (whose effects will be discussed more below) propelled implementation forward for most practicing physicians and hospitals who were expected to provide public electronic communication within the new space of healthcare. Interestingly, from yet another perspective, this dynamic climate of electronic messaging in healthcare likewise helped to compel *overall* public use of Internet-related technologies and resulting online interactions. That is, when the market for online medical communication surged, the public yet again gained another access point to increased online communication. In a sense, the entire adoption of online medical communication and secured portals not only reflected the existing demands of the public's desire for online access, but *created* an even greater need for it. More specifically, as more and more people realized the availability and convenience of online medical communication, they increased their own amount of online interactions because of experiencing the effects of this new application. For instance, when a psychiatrist treated a teenaged patient through a virtual eVisit that utilized the medium of Facebook or Skype, it may have more effectively enabled him or her to save a life by more directly halting an attempted suicide. In such a case, the medium (e.g., online eVisits through smartphone FaceTiming) influenced its overall user-friendliness and user-attractiveness. With public media dissemination of such "rewards" within healthcare, the medium therefore had the potential of becoming more acceptable and perhaps even more desirable. Therefore, the perpetuation of the medium in healthcare may very well have increased the usage of the medium itself (with or without medical information as the content of that message) within the medicological environment. With or without medical content, the technological environment existed; but the medicological environment (which included health-related content) affected and was affected by this environment while interacting with multiple other environments as well (again, such as legal, political, economic, and social).

In short, as stated earlier, the IOM stated that patients had the *right* to communicate through various media with their healthcare professionals, including but not limited to face-to-face communication (Institute of Medicine, Committe on Quality Health Care in America, 2001); and, by demonstrating this right, the public found itself curiously exploring new health-related technologies through the media of the computer and smartphones alike. When President Barack Obama first took office on January 20, 2009, he promised "change" for the American people with healthcare transformation as one of his top priorities. One might wonder whether the president realized the actual extent of his sweeping proposals which helped create the impetus for new forms of technology and more widespread, accessible Internet services. The system sustained itself and started to thrive. As technology evolved, so did the medicological environment; and with this evolution, so did the other players within it.

As stated earlier, although "email" through secured health portals had been named one of the key "new" forms of physician/patient communication, it was but one of many related media that allowed for electronic health communication. The smartphone, for instance, acted as a telephone, a texting mechanism, and a computer for Internet access. By using the Internet on the smartphone, phone calls could be made and text messages transmitted without using cell phone "minutes" but instead using Internet "data" (as when using the applications, "Viber" or "WhatsApp"). The physician could be reached by phone, texting, email, Facebook, Instagram, Snapchat, or Twitter (adhering to HIPAA regulations or not) all through the same smartphone that drew from texting allowances, cell phone minutes, and/or Internet data allotments, depending on which was preferred.

Again, such multipurpose uses of the same medium transformed the notion of separate communication spaces into continuous, multichanneled media, a concept best described by Bolter and Grusin (1999) as "remediation." If "a medium is that which remediates," then all the media being used to communicate through electronic health messages (or any form of electronic messaging for that matter) never "operate in isolation" but instead "enter into relationships of respect and rivalry with other media" (p. 65). The space therefore created an environment that transformatively utilized these interrelated media to the point that one could not separate the "representational power of a medium except with reference to other media" (p. 65). Paul Levinson in *The Soft Edge* refers to this as the "anthropotropic" process (1997). That is, new media continued to improve upon themselves and all prior technologies. These forms of media thus refashioned old media and began to take on each other's characteristics as forms of human communication (McLuhan M., 1964). In effect, over time all media used to transmit information between patients and physicians became extensions or remediations of other forms of human communication (as in "face-to-face" communication through Skyping during virtual eVisits with physicians). In a sense, the medicological environment provided a "hotbed" of continuously morphing technologies that adapted and reconfigured old technologies into "new" media of communication. Again, the best example of this was the "old" technology of the telephone being transformed into the cell phone and then the smartphone. With each transformation the applications became more overlapping and complex and in effect closer to other forms of media.

While these multifaceted usages existed for many users, some technologies were limited in accessibility to some members of the population as a result of various superimposed restrictions. Because of location, socioeconomic levels, education levels, media literacy, and learning impairment, many in this country have not had the opportunity nor means to become avid Internet users. Time, cost, and familiarity certainly had a profound effect on adoption. Despite these apparent roadblocks, availability began to increase significantly as access to the Internet improved through the FCC broadband expansion to rural areas, as free services in public places such as libraries and senior centers emerged, and as the Lifeline government-funded cell phone program for low-income Americans helped even the underprivileged obtain cell phone access to Internet and electronic messaging services.[29]

In short, the public response existed as a powerful entity in this medicological environment, affecting and being affected by the many forces in play throughout this complex and ever-changing space. As supported through various public opinion polls and government reports discussed in this section, change started early on with the introduction of new electronic messaging media (such as the smartphone) and then accelerated with EHR mandates promoted by the Obama Administration. Again, this change simultaneously affected *both* the physician/provider and the patient/consumer. Physicians often were also patients and found themselves at times in the consumer role, experiencing the very same challenges as their patients.[30] Multifaceted influences and remediated media existed simultaneously within this transformative space.

Early Response Patterns of Patients

In order to understand the interplay of factors affecting patient and physician responses to this environment, it is important to note that pre- and post-HITECH Act environments were very different for one key reason: Prior to 2009, communicating online between physicians and patients was an *option* not a government *mandate*. People who chose to communicate online about their health did so out of convenience, curiosity, or simple comfortableness with the technology itself. Some driving forces of course could have been at play, such as a techno-savvy lead physician in an urban group practice or an innovative department within a hospital system, but for the most part, physicians and patients who used electronic messaging with each other did so because they chose to. Once the HITECH Act went into play beginning in 2009, however, this freedom of choice became more of a mandate and with that came an increased sense of urgency and pressure to conform. There is a clear distinction between the pre- and the post-HITECH Act environment, but it would be erroneous to surmise that the flow of new technological advancements was not already in place well before the 2009 enactment. Instead, the enactment hastened the progress toward sweeping change.

To begin with, according to the Center for Studying HSC's "Tracking Report" of August 2008 (Tu & Cohen, 2008), more than 122 million people in the United States in 2007 reported seeking information about their personal health concerns. This represents 56% of American adults, up from 38%, or seventy-two million people in 2001. Of this group, 16% in 2001 and 32% in 2007 sought medical information on the Internet, indicating a doubling of online usage by the American adult. Reasons for this trend include an exponential increase in high-speed Internet residential access (Horrigan & Smith, 2007) and an increase in web-based health sites for consumers (Noonan, 2007). As access levels improved in more remote areas along with increased popularity and availability, this trend suggests the likelihood of higher usage rates over time.

When considering this statistical representation, however, it is important to note the apparent marginalization of certain cultures and/or subcultures. For instance, elderly Americans trailed their younger counterparts with only half of those aged 65 or older (48%) seeking health information in 2007, up from 31% in 2001 (Robert Wood Johnson Foundation, 2008). Indeed, health literacy rates suggested a substantial parallel to Internet usage with many patients unable to fill out basic consent forms (Kirpalani, Bengtzen, Henderson, Robertson, & Jacobson, 2006), follow simple numeric directions (such as "two pills three times a day"), or understand general explanations or instructions provided by their physicians (Polack, Richmond, & McCroskey, 2008; Bower & Taylor, 2003). Similarly, a 2007 study endorsed by the American Academy of Family Practice (Pelletier, Sutton, & Walker, 2007), revealed that 51% of respondents had Internet access at home, 47% had email at home, 30% relied on friends or family outside the home for access, 15% shared email accounts with family and friends, and only 12% neither used nor had access to the Internet or email. This 12% unfortunately represented the patients at risk who found themselves marginalized in this digital world. In short, due to access, literacy, and economic factors, the rural, low-income, elderly, and African American consumers were not as likely to have access to the Internet and therefore did not utilize emails (Liebhaber & Grossman, 2006). The "knowledge gap" among the "chronically uninformed" was further reinforced by the "digital divide" (Geist-Martin, Ray, & Sharf, 2003, p. 283) of computer literacy, which according to the *Journal of the American Medical Association* (Berland et al., 2001) required a much higher reading level for comprehension of web-based health information than did most other published health materials. The barriers preventing effective online communication with patients existed for some populations more than others. Therefore, since medical practices spanned groups of such diverse backgrounds and abilities, it is vital to remember these barriers in determining to what extent emails were or were not used as a means for communication in the healthcare setting.

Despite these significant cultural and subcultural differences, most of the American population that chose to interact online indicated that it was important to determine to what extent emails were wanted and used by physicians and patients. One study in the *Journal of Family Practice* (Couchman, Forjuoh, & Rascoe, 2001) found that 54.3% of patients from six area clinics (33–75%) reported having email access, with 90% of them using it for prescription refills, 87% for nonurgent consultations, and 84% for routine laboratory results or test reports. This means that over half of the population sample of 1,000 was actively using email as a part of their medical routine. These remarkable results, however, appear to reflect a population sample that was more urban and progressive in its use of technology. In fact, this study indicated that three out of four of the participants who used emails expected a response on their lab reports within twenty-four hours. This revealed a response time that was even tighter than advertised for most secured portals, typically a forty-eight-hour response period.

Other studies also in more populated areas seemed to reveal improved perceptions of the medium. As high as 78% of patients expressed the desire to communicate online with the physician and staff (Pelletier, Sutton, & Walker, 2007) while others indicated about 90% of patients using the service were women (Conn, 2003). In fact, a 2005 Harrison Interactive Poll showed that as high as 80% of patients across the country desired email communication with their physicians (Liebhaber & Grossman, 2006).

In direct contrast, another 2001 study similarly conducted in a rural area in Missouri revealed a much less favorable response in that few participants desired any online communication with their physicians (Campbell, Harris, & Hodge, 2001). It was strongly indicated throughout this study that locations that were skeptical of change needed to first justify the need for technology in the healthcare setting before expecting adoption and favorable acceptance.

The reason for this resistance particularly in rural areas may have been due to a lack of availability of high-speed Internet, cost factors, media literacy limitations, or a general resistance to change itself. Unless the means and motivation for change exists, the medicological environment lies relatively dormant until a precipitating force acting on the system from the outside (such as government mandates for EHRs and expanded rural broadband access) affects the equilibrium and promotes change. Change can take time, energy, and money to implement; and so the effectiveness of that change may be slow in coming. Nevertheless, technology continues to advance with or without the "blessing" of the healthcare profession. The external influence of technological advancements in other areas of life (such as the classroom, library systems, banking systems, etc.) penetrate the medicological environment and introduce instability, upsetting the equilibrium and driving the environment toward change. Resisting change due to fear of the unknown effect of these changes on the healthcare environment will merely slow down, not prevent the change from occurring. That is, the medicological environment adapts when external forces invade the system, driving it toward change.[31] Change is inevitable, perhaps resisted by some within that space, but inevitable, nonetheless. The *extent* of change, however, depends upon how well and to what extent members (such as physicians and patients) within that system choose to accept and adopt the change. Once placed into motion, the system alters and adapts while responding until it reaches an equilibrium, or relative stability—though the system itself is never static. Change from external forces in particular jar the dynamic system and cause it to react, adapt, and re-create the ever-changing medicological environment. At any given point in time, change elicits a response, alters the environment, and in turn re-creates or readjusts itself. Therefore, no two observations of this environment are ever exactly the same. Rural America from a medicological standpoint is affected by internal forces that are already being introduced by the more urban healthcare locations and the external forces of the outside world of new technological advancements. Simultaneously, the environment responds to internal and external influences. In the end, the system remains in flux as it continuously strives toward an equilibrium or period of settling into the change as it becomes the norm, until more change and more outside and inside forces alter the space (such as with a new technology or advancement).

Clearly, there was a distinct difference between rural and urban populations not only in their accessibility to the Internet but also in their receptivity of such new technology in medical settings. This was evident in the fact that even later adoption of EHRs toward Meaningful Use allowed for an exemption with the claim of "hardship"[32] when rural areas without adequate Internet connectivity were involved. The hardship of course had more to do with the physician practices and hospitals than it did with the patients themselves. That is, financial restrictions and penalties could not be forced upon physician practices and hospitals if they had no means for acquiring Internet for their patients or even themselves. Technological limitations outside the control of the physicians removed them from such accountability. If physicians could not provide the service, the patients could not use it. Meaningful Use mandates were therefore made irrelevant in such cases.

For the most part, willingness of physicians to participate in online communication with their patients depended upon their seeing the value, efficiency, efficacy, legality, security, and practical viability of such a medium. Patient adaption depended on the physicians' willingness to adapt the new technology into their medical practice.

Early Response Patterns of Physicians

Like response patterns of patients, the physicians for the most part showed a basic reluctance to use online communication for health-related interactions. One might think that since the average education level of physicians is markedly higher than that of the average member of the patient population, this would suggest a higher likelihood of technological adaption by the more formally educated physician. This may have been true for those physicians polled indiscriminately along with the public,[33] but this was not necessarily the case for most physicians. A sense of skepticism, a concern for time issues, a fear about financial ramifications, and many related matters surfaced in a wide variety of research studies examining physician response to this change

Early Implementation Data

If physicians adopted the medium of electronic messaging early on, then their patients were more likely to follow because the opportunity for using this form of communication was made available. In turn, the wealth of research on physicians' actions, perceptions, and attitudes concerning adoption greatly outnumber the research on the patients'. Additionally, research preceding 2009 for the most part suggests a relatively low willingness to adopt among physicians in general; however, research does predict that a growing *propensity* toward change was surfacing within the physician population. As the climate in healthcare prepared for the transition into electronic medical communication, the literature prepared for the physicians' *use* of this medium by addressing the many potential pitfalls, precautions, and scenarios that could happen once implementation occurred. Research likewise addressed the overall lack of physician acceptance and the undercurrent of skepticism.

According to the Center for Studying HSC research (Liebhaber & Grossman, 2006), there was a 4% increase in physician emailing with patients from 2000–2001 (20%) to 2004–2005 (24%). Comparative analysis of physicians' ages between the two time frames showed that 18%–20% of those younger than 35 used email, 21% to 25% for those aged 35 to 54, and 17% to 25% for those older than 54. The HSC concluded that this was most consistent with larger practices with 48% of the physicians being in health maintenance organizations (HMOs), 43% in medical school faculty practices, 29% in groups of more than fifty physicians, and 20% in groups of nine or fewer physicians. Likewise, the Commonwealth Fund National Survey of Physicians and Quality of Care in 2003 found that of the 28% of physicians who used emails, only 7% of these used them routinely compared to the 17% of patients who emailed their physicians, of which only 3% of this group did so routinely (Paulsen, 2006).

Early Guidelines for Online Interactions

This striking lack of overall adoption came with little surprise as this environment was not quite ready for widespread acceptance and implementation of electronic medical messaging at this time. Despite this sense of caution, interest and curiosity about electronic health messaging surfaced in the late 1900s at a time when Internet service, cell phone adoption, and political healthcare interest was on a rise. Those with foresight identified a definite pattern of change and began to write about it. In 1998, the *Annals of Internal Medicine* published an article predicting that a "critical mass" of Internet users would enable a wide diffusion of electronic communication within medical practices and that the email would stand out as the primary impetus for this change (Mandl, Kohane, & Brandt, p. 495). For many, this notion of a "critical mass" seemed unlikely as the thought of anyone substituting or even preferring an online interaction when seeking medical care simply had to be at best inappropriate and at worst harmful to the overall health of the patient. Besides, many questioned how a physician could even have the time to answer emails in a world already bogged down with paperwork and phone calls.

Within the same year of this forecast of pending change, Kane and Sands (1998) created a set of "Guidelines for the Clinical Use of Electronic Mail with Patients" as published in the *Journal of American Medical Informatics Association*. This seminal work, echoing the predictions of Mandl, Kohane, and Brandt (1998), prescribed the foundation for safe, online medical communication within encrypted environments—well before the secured portals were mandated by the HITECH Act over ten years later.

There are two basic concerns outlined in these guidelines relating to physician use of email: (1) the effective interaction between the physician and patient and (2) the need for medico-legal prudence.

Email should improve not complicate the physician-patient relationship. According to the AMIA guidelines (Kane & Sands, 1998), emails should rely upon a negotiation between the patient and provider with the emphasis on turnaround time, privacy, permissible transactions and content, and discreet, categorical subject headers. Unlike casual or personal email transactions, the formality and care with which the emails must be delivered, received, and recorded is of utmost importance for the security, privacy, and confidence of the patient. Patients might be spontaneous in their delivery, but the physician must respond with care, always treating the email as a legal document. AMIA further stipulated that automatic replies to incoming messages must be sent indicating who has received the message and when it will be responded to; email transactions must be archived in full and placed on the patient chart or EHR; action must be confirmed on patient's request with a return email; acknowledgment of messages from the physician office should be requested from the patients to assure whether or not and at what point they received the information; a footer should be used on all messages to direct patients to escalate communication if an emergency arises; the address book and group mailings (generally with educational information) should be recorded with care and sent using a blind copy to ensure privacy; and emotional content must always be left out of the email (including emoticons) to avoid misinterpretation. These and other instructions made the process of emailing very clear and were printed repeatedly in varied yet similar form in numerous medical journals and commentaries including (Morach, 2000; Mandl, Kohane, & Brandt, 1998; Patt, Houston, Jenckes, Sands, & Ford, 2003).

The issue of relationship-building and "patient-centered" care, however, extended far beyond laborious lists of warnings which placated (or inadvertently called to mind) physician fears of medical malpractice suits and security issues (Terry, 2001; Bates & Gawande, 2003; Mandl, Kohane, & Brandt, 1998). In an argument for the use of this technology, the AMIA outlined benefits of email over the telephone: The telephone is to be used for more urgent messages while email is less urgent; the telephone lends itself to "phone tag" and wasted operational time while the email is more asynchronous and provides printable and timed documentation (Houston, Sand, & Ford, 2004); the telephone lends itself to constant interruptions while emails may be all answered at the end of the day; and telephone misuse with private information left on answering machines that reaches the wrong hands does not happen with email so long as secured systems are used (Terry, 2001). In this sense, good communication is good insurance against medical malpractice problems (Kane & Sands, 1998).

Emails themselves needed to be handled with care to assure such benefits. HIPAA regulations proactively stated that email messages needed to be encrypted to prevent breaches of information or interception of data. Even small physician practices were able to use software such as pretty good privacy (PGP), but the patients' computer had to have the same software which could be downloaded from the Internet. A secure password shared between the physician and patient enabled both to have access to the medical data. A secure server messaging service such as Healinx, which was a hybrid version of online communication, was another possibility. Similar to sending an Internet greeting card, the patient had to go to a third-party server that was viewed as a web page (Morach, 2000). Either method enabled legal documentation between the two parties both for the physician's security and for the patient's (who in fact could have medical malpractice evidence of a medical error if a physician was not ethical or did not deliver sound medical advice). As *Medical Economics* (Terry, 2001) stated, this could be a "double-edged sword" (p. 27). Nevertheless, in all cases, no matter what the media, the confidentiality of medical information and the privacy of email were paramount (Mandl, Kohane, & Brandt, 1998).

Such a risk and time commitment by the physician caused many to refuse to use this medium without reimbursement, mainly due to liability concerns and fear of rising costs. In a survey by the American College of Physician Executives (Hawkins, 2001), over half the physicians surveyed stated that they would be willing to email medical advice to patients if they were reimbursed. Some significant strides were made fairly early on as identified by the *Physician News Digest* (Guadagnino, 2008), which listed the following: the creation of a current procedural terminology (CPT) code for physician online evaluation and management services; reimbursement agreements by insurance companies Aetna and Cigna for online consultations (then at about $25 per consultation); and announcements by large medical malpractice insurers that they will provide premium discounts for those who use email communication with their patients. This early endorsement by the government and insurance companies indicated a trending shift in favorability toward email use in physician-patient communication.[34]

Granted, much of the interactions with medical offices had to do with billing or scheduling issues which could be handled through the office secretaries. However, when email was used between the physician and patient, it became a medical document and, in turn, a potential liability for the practice. From this standpoint, the email created not so much a personal but a professional relationship, which in turn could justify a charge to the patient. According to the American Medical Association Council on Ethical and Judicial Affairs' report titled "Ethical Guidelines for the Use of Electronic Mail between Patients and Physicians" and adopted in December 2002 (American Medical Association, 2003),[35] emails were not to be used to *establish* a patient-physician relationship but should only supplement other, more personal encounters that took place during office visits. This clearly indicated that the American Medical Association's recommendation of email usage was restricted to professional interactions that were recorded and later placed in the patient's permanent records rather than to relationship-building, interpersonal messages.[36] Such restrictions paralleled the standards of face-to-face office visits and therefore had the potential to be charged when services were rendered. The email, in this light, was looked upon first as a business, not as a relationship-building, medium and therefore could be associated with an appropriate fee. Some questioned this logic by arguing that interpersonal interactions online could build a relationship over time (as further tested and discussed in detail in chapters 4 and 5). However, the rationale as presented initially through Kane and Sands' (1998) guidelines did at the time receive considerable support for the argument that emails were not about relationship-building.

The Physician Goal

In 2006, the *Journal of Health Communication* published an article reviewing the ten previous years' research in new technology as it related to the physician/patient dyad (Suggs, 2006). It stated that the fundamental goal of health promotion and disease prevention efforts is "to help health consumers and information seekers gain knowledge about health issues, maintain and improve health, and prevent disease and illness" and "to improve lifestyle behaviors, reduce risk factors for disease, increase compliance with a medication or treatment plan, better self-manage a condition, provide social support, or provide help with making decisions about health" (p. 62). In effect, the physician goal is to serve the patient effectively, efficiently, and appropriately all within the guidelines of the Hippocratic Oath and the security regulations of HIPAA. Patient-centered care requires placing the concerns and needs of the patient ahead of any healthcare organization, insurance company, private practice, or personal agenda.[37] A healthy, satisfied, trusting relationship between the patient and physician remains the paramount concern (Leong, Gingrich, R., Mauger, & George, 2005).[38]

As stated by Bradford W. Hesse, chief of Health Communication Informatics, “we need to tailor and personalize our information” because “communications itself becomes a therapeutic intervention” (Paulsen, 2006, p. 112). Likewise, the National Academy of Medicine, previously called the Institute of Medicine (Institute of Medicine, Committee on Quality Health Care in America, 2001), issued the following statement: “Patients should receive care whenever they need it and in many forms, not just face-to-face visits.” This implied that the healthcare system should always be responsive, and access to care should be provided “over the Internet, by telephone, and by other means in addition to in-person visits” (Rosen & Kwoh, 2007, p. 702). Direct, person-to-person, or mediated through a computer, the key to a trusting, effective relationship needed to involve multiple levels of communication, including but not limited to email or other forms of electronic communication with patients.

Throughout time, physicians have adhered to the primary goal of helping patients by administering care to them in a manner most effective and appropriate for each physician/patient dyad. No two people experience pain, illness, therapy, or treatment in exactly the same way. Each person has a unique past and present combination of experiences that affect the present and all subsequent interactions. Likewise, each person responds to each medium differently and even at different times in their lives or different stages of their illness/treatment. As with any communication interaction, the “subjects” are the people who engage within the dyad, and the process is as dynamic and unique as each individual within that dyad. Within reason, this means that physicians should be willing to adapt to changing media of communication (not only with each patient but as each individual patient changes over the course of time and treatment) in an effort to provide the best possible care for each patient according not only to the limitations but also the technical advancements available within any given situation. Beyond this, it is the physician’s responsibility to learn how best to use the medium to promote effective relationship-building and care with patients as the situation deems necessary. This emerging mindset placed a high demand on physician time and focus; but it simultaneously allowed for a fundamental transformation of how the medical profession viewed the physician/patient relationship and the nature of responsibility of care within this medicological environment.

As stated earlier, prior to the mandates for the Stages of Meaningful Use involving adoption of EHRs, patient portals, and basic electronic messaging between physicians and patients, there was a definite trend toward implementation of these new technologies within the healthcare profession. The likelihood of incorporating electronic messaging within the physician/

patient dyads existed merely because technology existed. Broadband access throughout rural areas, smartphone availability for underserved populations, and general familiarity with and acceptance of new technologies themselves opened the door for the possibility of such advancements within healthcare as well. Perhaps the door was opened more cautiously and carefully, but it was opened, nonetheless. As public settings gained access and eventual acceptance, so did private physician/patient settings as well. Indeed, change was inevitable. The key was how rapidly and forcefully this change would occur when healthcare not only accepted it but was required to use it.

THE PHYSICIAN/PATIENT RESPONSE TO NEW MANDATES: THE POST-HITECH ACT

Although the early response from the public to the 2009 HITECH portion of the American Recovery and Reinvestment Act ("Economic Stimulus Package") was clearly mixed, the greatest immediate reaction came from the physicians, as the change meant, in part, a general invasion by the government into the way they comfortably and, for the most part, independently practiced medicine. The patients as well certainly knew something was changing, as the daily news frequently brought up the new administration's rapidly evolving healthcare policies. Both an air of excitement and cautious curiosity flourished.[39] The rhetoric at the time focused on "affordable care" for everyone with no one being "left behind" even if the person worked part time, was unemployed, had a preexisting health condition, or was refused healthcare in the past for any reason. On the other hand, negative comments simultaneously focused on "death panels" for the aged and dying. Although the infancy of this transition for the most part reflected a positive tone, a definite, worrisome undercurrent existed concerning how this all would affect individual care, decision-making on elective surgeries, and the like (Singer, 2009).

In short, as with any presidential election period, some physicians favored the new administration's perspectives on health while others did not. The same mixed response came from the patients. The medicological environment exhibited strong political divides particularly in reference to the Affordable Care Act (ACA). It was viewed by some as an equal opportunity for access to care and by others as an all-out endorsement of "socialized medicine," reducing access to specialized treatment and overall quality of care. To some, "change" meant losing "control" over the basic freedoms of choice in how to acquire and provide health treatment. The notion of "government control" wreaked havoc on the minds of providers who already questioned such things as insurance company monitoring (e.g., the monitoring of brand vs. generic drugs, types of treatments, expense of specialized testing, etc.) let alone government mandates of technology implementation that promised to be costly, time-consuming, and lacking in overall development.

Talk of EHR implementation and the inherent electronic messaging component hit the heart, mind, and pocket of the physicians. To clarify this concern, an example may suffice. To begin with, a basic EHR system (necessary to even start the first stage of implementation) cost anywhere from $15,000 to $70,000 (Blumenthal & Glaser, 2007; Smith, 2003; Fleming, Culler, McCorkle, Becker, & Ballard, 2011) per provider with average startup costs in a physician's office ranging from $33,000 for on-base servers to $26,000 for cloud servers (included management fees and support). Over a five-year period, this amount averaged about $48,000 to $58,000, respectively, for each physician in the practice. These are basic costs that included hardware, EHR software, implementation assistance, training, and ongoing network fees and maintenance (HealthIT.gov, 2014). Of course, these costs were to be supplemented with government "incentives" if a practice adequately met the Meaningful Use requirements during each stage of the process. A maximum of $44,000 incentive paid over a five-year consecutive period for Medicare and $63,750 over a six-year period for those participating in Medicaid was possible (cms.gov, n.d.).[40] When considering the upfront costs to the individual physician, the fact that many physicians tried multiple EHR systems before they chose one, and the time, energy, and practice costs for employees, this entire process promised to be quite financially demanding on physicians, especially solo practitioners who had to cover these costs directly out of pocket.[41]

Besides this, when these stages were initially outlined and set into law, (1) the *specific* requirements of all the Stages for Meaningful Use were not yet determined, (2) the requirements kept changing as various government bodies and groups such as the American Medical Association sought to counter some decisions and compromise on others, and (3) all later Stages for Meaningful Use had merely been *outlined* with very broad requirements and a "to be determined" status. In fact, the Stage Two Meaningful Use requirements continued to be challenged and altered even while Stage Three requirements were being "discussed." In a sense, "the cart was placed before the horse" with the launching of a program well before the specifics of that program were even determined. It is therefore not surprising that physicians, hospital administrators, and other healthcare professionals felt confused and somewhat at a loss over whether or not to make this transition or suffer the consequences.

For older physicians, this latter option was a valid one in that by the time they purchased the technology, trained their staff, and adapted to the new EHR system themselves, the cost was not worth the time and effort when anticipating retirement. The threat of government penalties for those who chose not to comply seemed less costly than what it would take simply to pay out these penalties or, even worse, quit practicing medicine altogether. This in turn threatened to decrease the already-dwindling number of physicians in this volatile market.[42]

As Baron argued in the *Journal of the American Medical Association* (2010), "Physicians encountering a new technology such as EHRs typically use it to solve the same problems they were trying to address with older technologies. It takes time to determine that the new technology creates entirely new possibilities for practice (p. 89)." To Baron, all this fuss in the transition process boiled down simply to "managing information," and that information took time to manage when a new medium was involved with relatively inexperienced users. Once medical data was digitally recorded, the required phases of Meaningful Use naturally followed with electronic messaging being an intrinsic part of that transformative process. Perhaps it was that simple. However, implementation, when combined with the multifaceted components of the medicological environment, was all but simple. Adaptation may have seemed slow in coming; but it *was* coming nonetheless for both physicians and patients alike.

To attempt to make sense of this complex environment, it is important to break down key components affecting and affected by these related parts.

Systemic Surge in Internet Use

Considering that Internet and cell phone usage continued to rise over the period prior to the HITECH Act of 2009, one could assume that the rise would also continue, if not grow, exponentially due to this technology being implemented in healthcare. When a new functionality (secured patient portals) of an "old" medium (email/electronic messaging) was added into the mix, it was likely that more people would use the medium once it was made widely available to the public and incorporated into everyday life.

The extent of this dynamic change was addressed within the Preface of the Executive Summary of "The National Broadband Plan: Connecting America":

> Broadband is the great infrastructure challenge of the early 21st century. Like electricity a century ago, broadband is a foundation for economic growth, job creation, global competitiveness and a better way of life. It is enabling entire new industries and unlocking vast new possibilities for existing ones. It is changing how we educate children, deliver health care, manage energy, ensure public safety, engage government, and access, organize and disseminate knowledge. (Federal Communications Commission)

What was so remarkable about this statement was the government's expressed view of the magnitude of broadband's introduction as being like that of *electricity*. This calls to mind the notion of "electrical textuality" in Carolyn Marvin's book *When Old Technologies Were New* (1988, p. 12). Similar to her discussion of society's transformative response to the invention of electricity, perhaps access to the Internet through the channel of broadband allowed for the greatest authoritative change, a sort of "Internet textuality" or "broadband textuality" that linked a wide variety of communities that were controlled by various authorities whose special interest groups (such as banking or healthcare) would then allow monitored access to this universal connectivity (like electricity itself).

It is likely that the government was not calling to mind Marvin's concept; but it is evident that this change had tremendously influenced the entire country (and world for that matter) in ways that were only beginning to be identified and appreciated. Technological advancements in healthcare plus widely accessible broadband (through multiple channels including the smartphone) equaled a critical transition in how medicine was practiced, disseminated, controlled, researched, and accessed. Certainly, healthcare alone was not the only thing driving the broadband push, but it was something that strongly hastened its implementation.

Without the HITECH Act requirements pushing technology in healthcare to catch up (through EHRs), the demand for all rural areas to have such equal access would likely not have been so great. In fact, the National Broadband Plan (www.broadband.gov/plan/) explicitly stated four objectives recommended by the plan:

1. Help ensure healthcare providers have access to affordable broadband by transforming the FCC's Rural Health Care Program.
2. Create incentives for adoption by expanding reimbursement for e-care.
3. Remove barriers to e-care by modernizing regulations like device approval, credentialing, privileging, and licensing.
4. Drive innovative applications and advanced analytics by ensuring patients have control over their health data and ensuring interoperability of data. (Federal Communications Commission)

In short, the focus of reform was (1) rural areas, (2) incentive programs through Medicare and Medicaid, (3) EHR management through Meaningful Use program, and (4) basic online access that had interoperability between all EHR systems. This is what was showing up as the driving force behind the FCC and its National Broadband Plan for national healthcare reform.

The "Health" in HITECH

When using the acronym "HITECH" (*Health* Information Technology for Economic and Clinical *Health*), sometimes the emphasis on "health" was lost in place of the more visually prominent portion of the acronym, "TECH," suggesting technology.[43] The term "Economic" jumps out too in equal measure with "Clinical" in the actual title, indicating this transition had just as much emphasis on U.S. economic factors as it did on the clinical side of health. The notion that health was "big business" was a concept few would argue, especially those in health-related professions.[44] In this vast medicological environment, health, economics, technology, politics, and the like meshed together to create a very powerful impetus toward change. However, no matter how mixed this interest was, the primary reason for government focus on this transition into faster and wider Internet access was on improving *health* accessibility to members of the U.S. population. If active, accessible online communication and eventual virtual physician visits could in fact be realized, then all members of the public (rural and urban alike) could benefit from "affordable healthcare for all." The more accessible the physicians and healthcare providers were, presumably, the more available (and even "affordable") care for all could be.

Perhaps this may sound overly idealistic, but the HITECH Act made no excuse for lunging forward, especially when comparing the U.S. advancements with other competing countries. If such demands were to be placed on the physicians to utilize EHRs, then the means for doing so (broadband access) had to exist widely for all population bases. The government realized this and knew that electronic-based healthcare was the one area this country was lacking, especially in online data exchange.

In November 2009, the Commonwealth Fund published "The Commonwealth Fund 2009 International Health Policy Survey of Primary Care Physicians in Eleven Countries" (Schoen & Osborn, 2009). In this report, numerous research studies were cited outlining how the United States compared to other countries in its use of electronic communication and data storage in healthcare. Nine out of fourteen information technology (IT) functions had to be present to be EHRs; electronic prescribing and ordering of tests; electronic access of test results, Rx alerts, clinical notes; computerized system for tracking lab tests, guidelines, alerts to provide patients with test results, and preventive/follow-up care reminders; and computerized list of patients by diagnosis, medications, due for tests, or preventive care. The United States ranked only eighth out of eleven on this scale. New Zealand (92%), Australia (91%), and the United Kingdom (89%) stood at the high end, and the United States (23%), Norway (19%). France (15%), and Canada (14%) were at the low end. Additional studies concluded that there was a significant concern not only for the lack of IT adoption in United States but also for its inadequacy of reporting cost-related access problems (again due to a lack of electronic monitoring and recording) and overall lack of after-hours care (an area readily compensated with emailing physicians).

This factor of EHRs was cautiously yet dangerously overlooked for the most part by the American Medical Association, which realized that the existing demand on so few physicians could become greater with around-the-clock access to already-overextended health professionals, namely physicians. This concern had to be held into account when looking at other countries. Yet again the United States fell short in comparison with the eleven other countries of the Schoen and Osborn report (2009), in which the Netherlands came in first (at 97%), followed closely by New Zealand (89%) and the United Kingdom (89%). The United States fell to last place (29%) for not having around-the-clock access. Notably, this report came out in November 2009, which indicates that those who were gathering this statistical data had been doing so well in advance of the HITECH Act's implementation of 2009. Such data facilitated the argument for change at a time when the United States had no desire to take a back seat to international technological advancements.

Evidence in Numbers

Change, however, was in the making. When comparing usage rates before, during, and just after the HITECH Act, there was a continuous overall slide upward of broadband and smartphone usage with the greatest surge just after broad EHR implementations.

A Review of 2007 Statistics

According to a 2007 Pew Research Internet Project report on home broadband adoption (Horrigan & Smith), 47% of all adult Americans had broadband connection in their homes, up from 5% in early 2006. Of all those using Internet in their homes, 70% had broadband and 23% had dial-up. In fact, what was most striking was that it was not until between October 2004 and February 2005 that the percentage of people using broadband exceeded those using dial-up. In June 2000, 48% of households reported using any type of connection to check email or access the Internet compared to 47% who specifically had broadband connection in 2007. As Horrigan and Smith summarized, "the number of home broadband users in early 2007 is now roughly as large (on a percentage basis) as the entire universe of Internet users in the first year of the Pew Internet Project's surveys of online use."

Additionally, Horrigan and Smith (2007) further reported that rural home adoption rates (31%) lagged well behind urban ones with only 60% of rural adults using Internet from any location as compared to the national average of 71% of adults. Likewise, from a minority standpoint, 40% of African Americans had broadband connection at home with only a 9% increase since 2006. However, since 2005, the percentage of African American adults who had home broadband had almost tripled, from 14% in 2005 to 40% in 2007.

Information on other demographic groups (Horrigan & Smith, 2007) showed overall strong growth in broadband adoption between 2005 and 2006 with a comparatively more moderate overall growth in adoption between 2006 and 2007. Some demographic groups, however, did show significant year-to-year growth rates including those with annual household incomes under $30,000 (43%), African Americans (29%), residents of rural areas (24%), those with less than a high school education (24%), and those who said they had attended some college, but had not graduated (23%). Also, key findings from the Latino group (who filled out their surveys in Spanish only) indicated that 56% of Latinos got online from any location, which was lower than the rate of Internet usage among African Americans (62%) and rural adults (60%); that 29% of Latino adults had home broadband compared to 31% rural adults and 40% African Americans; and that among Hispanics that had home Internet access, 66% had broadband compared to 70% of all Internet users. In short, the Latino culture fared markedly worse in overall usage percentage rates than other minorities and the general public.

Finally, Horrigan and Smith (2007) also summarized activity patterns on the Internet, which showed that the largest majority of Internet users (home dial-up or broadband) sent or read emails (91%), looked for information about a hobby (83%), got the news (72%), did job research (51%), looked up information on Wikipedia (36%), read blogs (29%), and made online phone calls (9%). This report showed a wide range of uses of the Internet as well as a significant trend in using it for giving and receiving emails.

Considering this 2007 Pew report, a significant portion of the general population was using Internet, particularly broadband. Aside from significant disparities among various demographic groups, nearly half of the American public had access to and used the Internet with 91% of these using it for email exchange. These statistics are important because it was at this very time that government officials were busy paying close attention to these trends and monitoring the viability of engaging a much larger public in the area of electronic medical communication.

The Turning Point Statistics

As may be expected, various Pew reports showed proportionately greater substantial growth in all areas of online communication and Internet usage across most demographic populations after 2007. One key report on home broadband adoption came out on June 17, 2009, with several others in 2012, 2013, and 2014—all revealing marked upward trends in a wide variety of demographic areas and in broadband adoption in general.

According to a 2009 Pew Research Internet Project on home broadband (Horrigan, 2009), adoption went up a full 8% within one year from April 2009 to May 2008, rising from a 55% to a 63% overall adoption. This rate of increase was more than double that of the stagnating rise between December 2007 and December 2008 when only a 3% adoption increase occurred. Significantly, the greatest growth in broadband usage occurred in both senior citizens (those aged 65 or over) with a 30% increase and in low-income Americans with a 35% increase for annual household incomes of $20,000 or less and 53% for those with annual household incomes between $20,000 and $30,000. Other significant population increases were high school graduates who went up from 40% in 2008 to 52% in 2009; older baby boomers (ages 50–64) up from 50% in 2008 to 46% in 2009; and rural Americans up from 38% in 2008 to 46% in 2009. Those from higher-income and higher-educational levels experienced more modest increases with upper-income Americans (over $75,000) increasing only 1% from 84% in 2008 to 85% in 2009 and with college graduates (or higher) increasing from 79% in 2008 to 83% in 2009. Likewise, the African American home broadband increase was below average from 40% in 2007, 43% in 2008, to 46% in 2009. Again, there was a three percentage point increase each year, but it was not at as comparatively high rate of an increase as that of other populations, particularly the senior citizens.

According to Horrigan (2009), this increase was surprising because users were "largely immune to the effects of the current economic recession." Average home broadband fees increased from $34.50 in May 2008 to $39.00 in April 2009 with those having only access to one broadband provider paying an average monthly bill of $44.70. People were more than twice as likely to have cut back on their cell phone plan or cable TV as they were to have cut back on their Internet service. This speaks to two key issues: First, Internet was perceived as a more valued means of communicating than watching TV or talking on the cell phone. The second issue was that Horrigan did not mention the likely influence of the HITECH Act of 2009, which opened many government programs to improve broadband access and helped to propel forward the entire market of online communication with physicians through secured portals.[45]

Even though Horrigan did not mention this, he did ask users to rate their home high-speed connections on various dimensions of their lives and community. Several categories were rated as "very important" or "somewhat important" with two categories rising to the top: "finding what is going on in their community" (68%) and "communicating with healthcare or medical providers" (65%). Fascinatingly, people who chose to purchase and use home broadband did so largely because they wanted to know what was going on around them and they wanted to *communicate with their healthcare providers*. Although it would be pertinent to be able to compare this particular question as it likely changed from 2007 to 2009, this data is not available in this report. One might surmise, however, that if this question was asked pre-HITECH Act versus post-HITECH Act, the percentage of favorable responses in the area of online health communication would be vastly different.

What can be gleaned from this report is its overall relevance to a time period when the United States made significant efforts to increase public perception of online communication within healthcare. The HITECH Act initiated many new programs, but it also infiltrated the public with vast amounts of public media reports on how this change would improve healthcare and make it accessible to everyone. The act helped to provide both the means for increased broadband and the attention and education of the general public. Finally, it aggressively pushed the physician population to adapt EHR systems that heretofore were not being widely sought out and were certainly not something the general patient population even knew about. This study came out at a critical point in time in that it provided evidence and support for the effect that the government's aggressive implementation of EHRs into healthcare had on not only the healthcare profession but on broadband access and overall technology. The "Internet textuality" indeed started to penetrate the medicological environment with a jolting, almost electrical, long-lasting effect.

Post-HITECH Statistics

Zickuhr and Madden (2012a, 2012b) produced two related Pew Research Internet Project reports, both dated June 6 and both mainly covering Internet usage with a highlight on age comparisons that focused particularly on older adults. One may ask why a key focus on age was singled out by Pew Research teams. Although interest in older adults is significant in a broad sense, it was even more significant from a health standpoint since older adults tend to use the healthcare system more heavily due to the natural aging process and general increase of subsequent health-related problems. If the aging represented the larger patient population (particularly in areas of primary care such as Internal Medicine and Family Practice), then exploring whether this group used the Internet was critical. If only young, healthy consumers used the Internet and they were the ones who utilized the healthcare industry typically less often and with less complex and life-threatening problems, then why would physicians have had to communicate online if their largest population was "too old" to use the Internet? This particular argument was a valid one and appeared frequently throughout the medical literature (Schwartz et al., 2006; Kaiser Family Foundation, 2005; Neves & Amaro, 2012). The fact is, however, despite anecdotal comments and concerns by physicians,[46] older adults were found to be one of the fastest-rising populations to adopt overall Internet use. This rise of use promised to infiltrate the healthcare market as well in a very significant way.

As in the previously noted Pew report of 2009, the Zickuhr and Madden (2012a, 2012b) articles provided a wealth of data, this time largely in reference to an aging population. In their summary article (2012a), several key findings were outlined:

- For the first time, half of adults aged 65 and older were online.
- Once online, most seniors made Internet use a regular part of their lives.
- After age 75, Internet and broadband usage dropped off significantly.
- Seven in ten seniors owned a cell phone, up from 57% two years ago.
- One in three online seniors use social networking sites like Facebook and LinkedIn.

Strikingly, these conclusions revealed that older adults were not only being introduced into the world of electronic messaging, they were adapting to this new form of communication quite well and apparently even liking it. These findings revealed that the demands on healthcare professionals to use the online messaging medium were becoming more of a preference than just an option. Likewise, as people age and perhaps become disabled, there was always the possibility of a surrogate communicator online such as a younger adult who could act as the designated online communicator. This latter possibility was quite likely since already many young adults acted as spokespersons or "medical powers of attorney" for their older loved ones. This being said, if the door was opened to younger participants who already actively engaged in online messaging, the gap in the statistics for those over age 75 may have been compensated for through this designated and legal role.[47] Just as some elderly people wanted and needed a legal medical advocate to sign documents and make important medical decisions in person, some also needed and wanted someone to communicate for them online. The point is, the increase in online communication identified in this 2012 Pew Research study may technically have been even greater when considering online patient advocates who were already quite familiar with electronic messaging. Either way, the door to the older population's use of electronic medical messaging within secured EHR portals was certainly widening.

More specific information concerning Internet patterns were outlined in the main Zickuhr and Madden article (2012b), which showed a detailed comparison between the older adults and their younger counterparts. To begin with, as generally stated above, 53% Americans aged 65 and older used the

Internet, not just by happenstance but in a purposeful manner.[48] In examining the number of American adults aged 18 and over who used the Internet between 2000 and 2012, in every age group there was a significant rise with the sharpest assent in the 65+ age category over the previous year. Specifically, in adults aged 50–64, 77% used the Internet. Furthermore, 82% of all adult Internet users went online in an average day with 76% aged 50–64, 86% aged 30–49, and 87% aged 18–29.

Gadget ownership by age group also measured how engaged the older population was by comparison. Four groups were examined in the following age categories: (1) 18–29; (2) 30–49; (3) 50–64; and (4) 65+. As may be expected, group 1 outranked all others in the area of cell phone ownership (95%) followed by group 2 at 94%, group 3 at 87%, and group 4 at 69% as well as in the area of laptop ownership (75%) followed by group 2 at 69%, group 3 at 57%, and group 4 at 32%. However, when examining the category of e-readers and tablets, all groups were significantly down with group 3 (aged 30–39) as the largest ownership group, due possibly to the "luxury" association with these more high-priced items. For e-readers, group 1 was at 18%, group 2 at 23%, group 3 at 16%, and group 4 at 11%. For tablets, group 1 was at 20%, group 2 at 26%, group 3 at 14%, and group 4 at 8%. These numbers reveal that in all categories e-readers and tablets were not as popular for Internet access and that older adults did in fact use these gadgets and use them almost as much as their younger counterparts. Much larger differences existed between younger and older users in the categories of cell phones and laptops than what existed between the various age groups in the categories of luxury gadgets (e-readers and tablets).

Although Facebook and LinkedIn were used by all age groups with a startling number of older adults doing so (34% of ages 65+ used social networking and 18% did so on a typical day), among all age groups 66% used these sites with 48% using them on a typical day. These findings suggested that all age groups were well represented as technology users with those over 65 maintaining a significant amount of activity, greater than may have been expected anecdotally.

Finally, even more significant than social networking was the use by all age groups of emailing, the "bedrock of online communication for seniors" (Zickuhr & Madden, 2012b). A startlingly high percentage of online users engaged in emailing across the board, with 91% aged 18–29, 93% aged 30–49, 90% aged 50–64 and 86% aged 65+. Even though younger individuals may have used such social media as Facebook or Twitter more for quick electronic messaging than for emailing, emailing was still highly used by all age group sources with the 65+ population apparently using the medium mostly for this purpose. Of course, these numbers were somewhat deceptive in that they were describing the type of Internet usage as being emailing but they were not saying that 86% of all those in the population aged 65+ were using emails. Of the 70% of Internet users aged 65+, 86% of that 70% used it for the purpose of emailing.

That is, minus all the numbers, if the majority of the older patients who represented the largest portion of healthcare users were communicating through email, then it appeared that this population, once introduced to the online secured portals (individually or through patient advocates), would be very active users. Physicians began to realize that they would have a substantial need for online communication once this medium in healthcare became as popular as it was in general everyday life for this age group of patients.

Another Pew Research Internet Project report came out on August 26, 2013, as a follow-up with a broader look at demographics and an emphasis on mobile usage (Zickuhr & Smith, 2013). As of May 2013, 70% of the American adults aged 18 and older were found to have Internet, a small but significant rise from the 66% in April of 2012. Demographic factors again correlated with home broadband adoption associated most significantly with educational attainment, age, and household income. What is interesting is that while the overall "jump" that seemed to parallel the HITECH Act of 2009 implementation was not as evident, the steady increase appeared to resume.

In this report as with many of the subsequent ones cited from 2013 on, the focus turned to the smartphone as the new mobile access for broadband; and because of this access, the statistical analyses had to take into account the overlap between the two modes of transmission. Zickuhr and Smith (2013) discussed how the smartphone gradually became the alternate form of "home" Internet access with 56% of American adults owning one compared with the 70% who had home broadband. These figures, however, overlapped to some extent since some of those who owned a smartphone did not have home broadband (32%), which meant that roughly 80% of Americans therefore had *some* form of access to the Internet whether it was home broadband, smartphone, or both. More specifically, 46% of Americans had both broadband connection and a smartphone; 24% had home broadband connection, but not a smartphone; and 10% had a smartphone, but not a home broadband connection. This meant that an even higher percentage of people had the means to communicate online with their physicians, not only from the privacy of their own homes but from anywhere their phones could access the Internet. More than ever this allowed for almost constant physician access at any time from nearly any place. The smartphone mobilized the Internet, making broadband access instantly more accessible and in turn patients' ability to communicate with their health professional online virtually uninterrupted.

Zickuhr and Smith (2013) cautioned that this 80% of overall accessibility may have suggested a gap narrowing or widening for some demographic groups, but in most cases this ended up as a moot point. They explained that although “blacks and Latinos are less likely to have access to home Internet than whites, their use of smartphones nearly eliminates that difference.” At the same time, this same accessibility exacerbated the differences between various age groups:

> We find that 80% of young adults ages 18–29 have a high-speed broadband at home, compared with 43% of seniors ages 65 and older—a gap of 37 percentage points. If we include smartphone ownership in our definition of home broadband, this gap actually increases to 49 percentage points, because young adults are more likely than seniors to own smartphones as well. Adding smartphone ownership to home broadband use, we see that the proportion of young adults who have “home broadband” under this definition increases from 80% to 95%, while including smartphones has no discernible impact on access rates for seniors—the 46% of seniors who have broadband or a smartphone is little different from the 43% who have broadband at all. (Zickuhr & Smith, 2013)

Simply put, the gap seemed to narrow or disappear from a racial standpoint; but the gap seemed to remain the same or worsen between various age groups. Considering these variables was important in attempting to capture the full impact of smartphones on home broadband use; but the real issue relevant to the perspective of physician/patient online communication was that access between various demographic groups for the most part was improving yet still lacking to some extent when compared to the overall public usage rates.

Interestingly, in the 2011 Engineering Rysavy Research report, the projection of smartphone data consumption usage levels was calculated to increase from about 0.3 GB per month to almost ten times this amount per month from 2010 to 2016. Considering these projections and subsequent Pew reports, a tremendous surge in the overall smartphone/Internet market was expected to parallel physician/patient online electronic messaging and secured portal usage.

The dissemination of new media appeared to hold a direct correlation in general with the overall broadband and smartphone usage patterns and with the HITECH Act involving physician/patient online interactions. Likewise, the Pew Research Internet Project created considerable attention considering the Internet itself. In all, eight reports were slated to be released on the topics of privacy, cybersecurity, and the “Internet of things” (Fox & Rainie, 2014). The exploration was thought to factor in economic change driven by faster and less-expensive digital tools as well as ongoing information on how the American public would respond to and perceive these media of change. It was suspected in general that the huge leap in usage would not occur until online medical communication also peaked; though, in this medicological environment, all factors that played on the general population inevitably played on the medical arena as well—directly or indirectly.

Interesting about the timing of these reports was that the implementation of Stage Two Meaningful Use was officially delayed publicly through the Federal Register dated September 4, 2012, through the HHS and the Centers for Medicare and Medicaid Services (Department of Health and Human Services, 2012). Through much negotiation and consideration of the readiness not only of hospitals and physicians' offices but also of vendors who provided the EHR product, the official date of implementation was moved forward from 2013 to 2014. As mentioned earlier, the American Medical Association commissioned a RAND Health report (Friedberg et al., 2014) that reflected physician dissatisfaction with the Meaningful Use timeline and overall program, indicating that physicians felt it was "burdensome" and in many cases "doing nothing to advance patient care." This timeline delay allowed physicians who were having difficulty with software issues of EHRs to gain an additional year before applying for Stage Two Meaningful Use attestation. Therefore, this period of government bodies converging with widespread information and change either accidentally, purposefully, or luckily happened all around the same time, fascinatingly surrounding the issues of healthcare, EHRs, and electronic medical exchange of information and communication.

The stated reason for this attention by Pew at this particular time was because of the World Wide Web turning twenty-five years old on March 12, 2014. Pew chose to "celebrate" the history of Sir Tim Berners-Lee's launching of an early data transfer system for specialists to a mass-adopted technology for the world. By celebrating the web, Pew took this opportunity to celebrate the Internet itself and the many associated uses for it. Of course, as Pew aptly pointed out, the "web" and the "Internet" are not one in the same thing. The web is a means for navigating the architecture of the Internet, just as email is also a means of navigation.[49] Nevertheless, noting the prevalence of these public research reports is important because the medicological environment which inevitably responded to this research was affected at this time by the added attention this celebration afforded. Fox and Rainie's perspective was certainly a positive one, stating that the "overall verdict" of the web's public influence in the United States at that time was that "the Internet has been a plus for society and an especially good thing for individual users" (Fox & Rainie, 2014). In using the Web by browsing, searching, and sharing on it, the web had become "the main activity for hundreds of millions of people around the globe."

In their detailed report, Fox and Rainie (Summary of Findings, 2014) attested to a 2014 adoption of Internet usage by 87% of the American adult population with 99% in households earning $75,000 or more, 97% with young adults aged 18–29, and 97% with those having college degrees. Adult ownership of cell phones rose from 53% in 2000 to 90% in 2014 and that of smartphones (with mobile broadband access) rose from 35% in 2011 to 58% in 2014. These numbers appeared to represent almost universal trends in Internet usage through both home and mobile access.

These results were startling when considering the brief period within which this transition occurred. This dynamic burst in technology truly can be appreciated when comparing how the 2007 growth rates maintained a slow but steady rise, the 2009's HITECH Act seemed to ignite the impetus, and then the 2014 numbers appeared to reflect an almost-universal acceptance. Pew focused in on the positive; but Pew did not speak in detail about the ongoing disparities still evident in various demographic subgroups. The purpose of this report appeared to be a celebration of the World Wide Web and growing Internet use and not the remaining discrepancies between the richer upper-class majorities and the poorer lower-class minorities.

Nevertheless, this report revealed some significant findings. Through a series of interviews of Internet users, their expressed perceptions and feelings concerning this medium's impact were measured. The results were positive. When asked whether the Internet had been a "good thing or bad thing" for them personally, about 90% of all users said it was good with only 6% saying it was bad and 3% saying it was "some of both." Respondents in general were less positive with 76% of the users saying the Internet was a good thing for society, 15% saying it was bad, and 8% saying it was both.

When asked how difficult it would be for the general public to give up their technologies, adults in general replied that the Internet would be the most difficult (46%), followed by the cell phone (44%), television (35%), email (34%), landline phone (17%), and social media (10%). When these numbers were compared to earlier reports and examined only from the *active* users' perspective, the statistics became even more revealing with 53% of all Internet users saying at a minimum it would be "very hard" to give it up compared to 38% in 2006. Similarly, 49% of all cell phone owners said giving it up would be "very hard" as compared to 43% in 2006. For television, 35% said it would be hard in 2014 and 44% in 2006. Finally, landline telephones showed the most dramatic change with 28% saying they would be "very hard" to give up in 2014 as opposed to 48% in 2006.

This comparative data reveals compelling perspectives on past media usage. Overall, Internet and cell phone usage was considered almost equally hard to give up, perhaps indicating an overlap in how these two media were used; that is, "smart" cell phones provided mobile Internet. However, when the comparison was made between the *active* users between 2006 and 2014, it was found that those who could not "give up" the Internet (15 percentage point difference) were more than twice as concerned than those who could not give up cell phones (7 percentage point difference). This suggested that what people did not want to lose out on in cell phone usage was their Internet access; though this remains questionable since the distinction between *types* of cell phones was not made in this particular study (smartphones vs. regular cell phones) nor did it distinguish between how people used their cell phones (to text message, FaceTime, Internet searches, games, etc.).

Even more interesting is the fact that email was not as favored as the Internet overall. This again suggested that the various forms of communication and information seeking on the Internet far outweighed the desire to communicate through emails online. At the same time, the television and the email were roughly the same in general favorability to the overall public. This was evidence yet again of the changing patterns of technology. It also indicated the overlapping of technology since television programming could be obtained online through the Internet (e.g., on Netflix). This meant that even if a person could do without the traditional high-definition television, he or she could not necessarily do without the potential for access to the online programming.

Therefore, as Pew examined the favorability of the Internet in comparison with other forms of technology, it had to keep in mind that many factors affected the interpretation of this data, especially specifics on demographic differences. For instance, a subsequent report came out on April 3, 2014, focusing yet again on the older adult (65+ age group) population (Smith A., 2014). Several important findings were noted based on the earliest data available drawn from 2013 surveys: 59% of seniors reported going online (6% up from the previous year), 47% said they had high-speed broadband, and 77% had a cell phone (up from 69% in April 2012 study noted earlier).

Despite these phenomenal gains, the seniors still trailed behind their younger counterparts in technological adoption (77% older adults using cell phones vs. 91% all adults and 59% older adults using Internet vs. 86% of all adults). Besides this lag, however, it was important to remember that the population of seniors who did not adopt any new technologies was significant (41% did not use the Internet, 53% did not have broadband at home, and 23% did not have cell phones). These discrepancies were quite substantial, especially when considering that seniors represented the largest number of patients in the population. However, when the demographics were further broken down into the higher-income, more highly educated seniors, the Internet usage and broadband adoption approached and at times exceeded the general population. Specifically, of the seniors with an annual household income of $75,000 or more, 90% went online and 82% had broadband. This was in severe contrast with those seniors with an annual household income of less than $30,000 with 39% going online and 25% having home broadband. Likewise, 87% of seniors with a college degree went online and 76% were broadband adopters, while of those not having a degree, only 40% went online and 27% had home broadband. These differences were significant to consider when physicians were treating various demographic regions affected with a combination of age-, income-, and education-related factors.[50]

As Smith (2014) concluded, there were also many factors as to why older adults did not use cell phones and the Internet in general even beyond education and income including physical impairments such as vision issues, handicaps, chronic diseases, and the like. Many had skeptical attitudes toward the new technologies in general, learning difficulties, or general misperceptions about them.[51] One thing for certain, however, was that compared to their younger counterparts, older adults were nearly as likely to continue to use the technology once they did learn how to use it. Specifically, 94% of those aged 18–24 used the Internet overall with 88% using it every day and 6% of that group using it only a few times a week as compared to 82% of those in the 65+ age group who used the Internet overall with 71% using it every day and 11% using it a few times a week. This indicated that seniors still lagged behind, but they did have a strong commitment toward their technology once they learned to use it, just as did the younger adults.

Eligible, able adults, therefore, were thought to be very likely to use technology within healthcare if time was spent training them and providing the service to them or their patient advocates. This led to the notion of physicians as educators, that is, health professionals who helped patients learn to communicate and access information online through EHRs and secured patient portals. Change indeed was evident through these many Pew reports on technology (from emails, to the World Wide Web, to the Internet) and within multiple divisions and departments within the government.

The March 11, 2014, Pew Internet Project Report called "Digital Life in 2025" lead with a large-type italicized statement: "*Experts predict the Internet will become "electricity"—less visible, yet more deeply embedded in people's lives for good and ill*" (Anderson & Rainie, 2014). This lead called directly to mind the idea of the Internet and new media in general as being something greater than an individual new product (such as the newest video game or iPhone application). It was so intertwined with the lives of the general public that it swept aside the importance of media like smartphones and EHRs for that matter and replaced it with an entire environmental transformation. The "electricity" of the Internet and all its components was becoming such an inherent aspect of life that it lost its identity as a separate medium and became a part of the context of life that for the most part was not even noticed. The Internet had become an accepted reality, an expected reality. It was the new normal. Just like turning on a light switch in the dark, the only time one really noticed its existence was when it did not work, when the dark was not automatically replaced with light, when the computer screen crashed, or when access to ones best friend (or physician for that matter) was not instantaneously accessed with the stroke of a key. Life in most developed regions became so dependent on the Internet's architecture that it was something that simply existed, something that was expected or taken for granted and only noticed if something went wrong. Like the sun shining on a computer screen of emails about health issues, the health issues became the focus while the sunlight that produced the electricity, the electricity that enabled the computer, and the Internet that directed the email were all relegated to the background of awareness. As stated early in the article, "The world is moving rapidly towards ubiquitous connectivity that will further change how and where people associate, gather and share information, and consume media" (p. 5). This was the focus of Pew's new projects, the assumed future of the Internet by 2025—or sooner.

Specifically, this report solicited responses from more than 12,000 experts and interested members of the general public inquiring about the projected impact of the Internet over the next ten years. Specifically, between November 25, 2013, and January 13, 2014, the Pew Research Center's Internet and American Life Project and Elon University's Imagining the Internet Center gathered 2,551 responses from 1,867 individuals from around the world.[52] In all the responses, five "more hopeful" themes were listed:

- A global, immersive, invisible, ambient networked computing environment built through the continued proliferation of smart sensors, cameras, software, databases, and massive data centers in a world-spanning information fabric known as the Internet of Things.
- "Augmented reality" enhancements to the real-world input that people perceive through the use of portable/wearable/implantable technologies.
- A continuing evolution of artificial intelligence-equipped tools allowing anyone to connect to a globe-spanning information network nearly anywhere, anytime.
- Disruption of business models established in the twentieth century (most notably impacting finance, entertainment, publishers of all sorts, and education).
- Tagging, data basing, and intelligent analytical mapping of the physical and social realms. (p. 23)

These themes could be categorized as a global networked environment, an augmented reality, an evolution of artificial intelligence, disruption of business models, and analytical mapping.

Again, this list is reminiscent of Marshall McLuhan's "global village" (1962), which he predicted would unite (network) homes and lives from around the world through media that transformed an earlier world that was separated by oceans and continents to one shared by all through merely turning on the television or radio. Some argued that he predicted the World Wide

Web thirty years before it was invented (Levinson P., 1999) and certainly before it became a ubiquitous staple of everyday life. Yet, as amazing as these reflections from past predictions were, what these themes said of the future was astounding. The Internet with all its interrelated layers of media (smartphones, emails, texting, Face Book, Snapchat, etc.) networked people, businesses, governments, cultures, and virtually all systems while providing huge databases for analytical analysis left in the trail of these interactions (as no email or computerized transmission of any sort was really ever erased or "trashed"). Delivery of messages was fluid and simultaneous; yet those messages were trapped, contained, stored, and retrieved and forever recorded in time and space. This of course called to mind the very same fluidity and spontaneity of the electronic medical message exchanged through secured portals. These messages were forever recorded for future reference and analyzed not only by the physician in charge but by the government body or independent researcher who obtained access to this data (emails, texts, Facebook exchanges, etc.) for business, professional, educational, or even personal purposes.

The Pew report also listed "less-hopeful themes." These indicated fears of divides emerging between those who knew technology and those who did not, resulting in violence, government and corporate power struggles, security and privacy issues, and inadequate responses to complex networking challenges. This list likewise reflected upon general technology concerns as well as called to mind the very concerns already evident in the minds of those who used electronic messaging. Security was always an issue, especially when data breaches meant that patient information (typically including social security numbers) was being stolen at an alarming rate across the country due to the less-than-secure firewalls protecting the data itself. Laptops with patient data had been stolen. Databases had been lifted. Unlike the transition into ATM machines and online banking, there seemed to be an even-more dangerous threat to healthcare information due in part to the personal nature of the information, allowing entire identities to be stolen from thousands of people in one fast swoop of stolen medical records. These were relatively new concerns that promised to become more and more evident and worrisome in the future.

The issue was a frightening one when information fell into less-than-reputable hands. For instance, according to the 2013 Breach Report: PHI executive summary, a total of 904 large breaches of PHI had affected over twenty-nine million patient records as reported to the Secretary of HHS since the HITECH Act of 2009 went into effect (Redspin, 2014).[53] Another remediation group, Experian, worked on more than 2,200 breaches in 2013 as compared to 2012 with the key reason for these breaches in healthcare cited as "system administrator sloppy password practices" (Carr, 2013). Healthcare information in particular became quite valuable, especially on the black market with personal records including identifying information being sold for anywhere from $10–$12 to $25–$28 (for a more “attractive” identity). As Carr (2013) stated, “the value of an identity data set jumps to about $50 per record, because then it can be used for medical and insurance fraud.” Identity became “big business” in the black market, and such a business challenged the very privacy and security of the public. In short, the fears articulated in the Pew report (Anderson & Rainie, 2014) were certainly valid ones not only in general across all areas of life but also in the healthcare arena. If online secured portals within EHR systems were to be mandated, the essence of HIPAA and patient privacy had to be addressed just as the respondents of this Pew report stated needed to be done in other areas of public life.

Both the negative and positive implications of these themes called to mind the inevitable excitement and fear of the unknown, of something that transformed “life as we know it” into a world of possibilities and pitfalls. Some looked forward with anticipation, and others with trepidation.

The final theme which looked toward these promises and challenges of the future stressed the need to be proactive stating, “The best way to predict the future is to invent it” (p. 57). The key of course was in how this future was invented, who did the inventing, and who controlled this process.

The Pew report (Anderson & Rainie, 2014) ended with a treasure chest of recorded responses from the surveys. As above stated, themes were qualitatively drawn from these responses. However, several conclusions *not* noted in the report warranted attention: (1) Healthcare was barely mentioned throughout the entire report; (2) no health-related professional was included as a respondent; (3) the majority of the communication-related contributors honed in on the idea of media as a mode of public space within a global reality reminiscent of Marshall McLuhan,[54] and (4) the notion of “future” could only be framed in past and present experience (observations), meaning that predictions were educated guesses and no one could ignore the possibility of the unknown emerging as something totally unpredictable.[55] What was omitted spoke as loudly as what was included.

Finally, perhaps the best overall response was written by Elizabeth Albrycht, a senior lecturer in marketing and communication at the Paris School of business, who reflected upon the concept of the changing relationship of media with the public and who was one of the only recorded responses who alluded to healthcare:

> By 2025 . . . our lives will be lived in a combination of virtual and physical spaces, and it will feel completely normal for most of us. . . . The Internet is us and we are it. The Internet becomes the extension of the human mind and body. It is multiple, as are we. There will not be any big “event” of adoption—we’ll

> just naturally move there. Many of us are already close. The benefits are too big, too obvious to think otherwise. These include the ability to stay alive longer as healthy people. Who would say no to that? (p. 55)

The environment or space within which technology exists is a fluid one. It reacts to the introduction of new technologies by altering its own image in space and time. It is noticed at times and unnoticed at other times. Simply put, the space is as much a part of the technology as the technology is of the space. Indeed, an environment is created. Some could call it "Internet Textuality" as earlier suggested. Others might call it a "Global Village." This environment, however, exists within a unique, ubiquitous space that is intimately, permanently, and almost transparently intertwined with the technology that drives and is driven by it. The medicological environment exists in and of itself as an entity of observation, one that involves all demographic categories within all professions at all times, in a manner so basic to human life in general and the human body in particular that it cannot be separated from who one is or from how one functions within this environment. History contextualizes technology and gives it meaning.

Physician/Patient Response Patterns

With all the media hype surrounding the election of a new president and the many unfolding government program names like "Obamacare," the ACA, the "Stimulus Package," and the HITECH Act being tossed around, one might assume that physician/patient online communication would eventually become commonplace and healthcare professionals would quit any remaining resistance at least before the second term of the Obama Administration. In effect, however, the medicological environment continued to adapt to change as home and broadband access increased, demographic population differences decreased for the patients, modifications of healthcare regulations surmounted, and new governmental health policies continued to emerge.

At the same time, attesting to meaningful use through EHR systems remained a focused challenge for many physician and hospital-based practices as resistance continued and regulations changed. By April 16, 2015, President Obama signed into law the Medicare Access and CHIP Reauthorization Act (MACRA), which combined parts of the Physician Quality Reporting System (PQRS), Value-based Payment Modifier (VBM), and the Medicare EHR incentive programs into one single program called the Merit-based Incentive Payment System, or "MIPS." Rather than the previous Medicare reimbursement schedule, this new pay-for-performance program focused on quality, value, and accountability. As time went on, those who continued to submit meaningful use data began to incorporate it to comprise between 15% and 25% of their MIPS score. As regulations remained, terms, conditions, and criteria continued to be reinvented.[56]

The reality became evident that there was still a long way to go for electronic health messaging within the secured portals of interoperable EHR systems to take hold as naturally as emails had for the general public. Somehow the EHR/secured portal medium was different. It harbored deep fears of privacy and security, threatened insurmountable costs and transition burdens to physician practices, and perhaps challenged the very relationship formed by the face-to-face office visit. No, for emails to become commonplace in medicine, more time, testing, and preparation needed to come about before both the physician and the patient could respond to this medium with fully outstretched arms. Certainly, there was an awareness of this process, but the awareness needed to translate into usage if the projected benefits of online communication between physicians and patients could be realized.

Patient Response Patterns

As electronic messaging took root and developed within the field of medicine, both physicians and patients reacted not only to the medium itself but to each other's response to that medium. Patients typically learned about the option for online messaging when the physicians' offices told them about it. Physicians learned how much patients liked or did not like the online factor based upon their rate of usage[57] and expressed enthusiasm for the medium. It is unlikely that most patients and physicians got their information from published statistics on how each other felt about the medium. They more likely talked to each other about the medium when it entered the environment of the office visit and took on its increasingly more prominent role in the care of that patient.[58] Again, adoption depended upon an ongoing sharing of information, problems, interests, fears, and overall knowledge about how this new means of communication could effectively translate into a medium that worked to facilitate physician/patient relationships and overall patient care. The medicological environment shifted and responded (a sort of ebb and flow of untested waters) to this as it continued to reach toward a desired state of equilibrium wherein both sets of users could incorporate this new technology into commonly accepted, day-to-day usage.

In time, the environment gradually shifted its focus from the obvious physical presence of the computer to the various functionalities of the EHR itself. Research in this field revealed this changing perspective as well. For instance, earlier on, research focused more on the physical presence of the computer during the medical visit considering how the object itself interfered with the eye contact of the physician and the overall medical interview (Hsu et al., 2005). Now the focus was on how patients were responding to the new *functionalities* of the computer including the secured portals which enabled access to lab reports, prescription refills, billing information, health updates, and, of course, electronic communication with the physicians themselves. The system was still working toward accepting computers in physicians' offices and in hospitals as common place.[59] Whatever the case, one-way communication (e.g., physicians placing patient record information in EHRs or sending out automated educational messages to patients through portals) could not be considered an interaction. Both members of the relationship had to want to use this form of communication if it was to work and be effective.

It must be emphasized that an electronic message implies shared communication between two individuals, a relationship-generating, interactive unit between two parties of equal participatory value.[60] For the most part, up until the requirements for EHRs and secured portals, the perception of communicating with one's physician online was more of an anomaly, especially in rural and underserved regions. The thought of emailing physicians at any time from any place might almost have felt like an invasion of privacy just as calling physicians directly on their private lines or personal cell phones in the middle of the night would be. Special permission had to be given to gain such a right, and that permission was technically granted by (and required through) the Stages of Meaningful Use. Physicians who chose to purchase and implement EHR systems made the choice to add this means of communicating as part of their relationship with their patients.[61]

This relationship, however, was new to patients and physicians alike. It took an adjustment period to learn how to adapt not only to the use of the medium but the fact that patients and physicians shared almost equal space and an equal right of access to each other all day, every day through email. Office phones guarded the physicians with answering machines, answering services, and secretaries. The same existed for emails with inboxes, auto responses ("Please do not leave emergency messages on this service."), and portal "keepers" (medical secretaries and health professionals used for directing emails). However, there was still something more personal, more direct, and more invasive about writing an email in the middle of the night directly to one's physician (even though the message might not be received until the next day).[62] Furthermore, once the secured electronic message was "linked" to a physician through his or her response within the system, the emails (in most EHRs) tended to be received directly and not intercepted by the medical secretary at that point. The physician could thus choose to continue with a direct interaction with the patient as opposed to one that was first screened by a medical associate. If a physician also had the email "pushed" to be received immediately with perhaps a ring tone set as a warning as to when a message was coming through, that noise in the middle of the night could in fact be an intrusion of space and time. However, the physician had control of such "settings" perhaps more than on the landline phone since the phone had to be answered when the physician was on call. Emails did not have to be answered any sooner than twenty-four to forty-eight hours depending upon the protocol of each EHR system. As emails became more commonplace (like phone calls), the usage rules started to change as well.

Studying how these relationships changed as the medium was adopted and became more and more a part of physician/patient interactions was a vital part of understanding the effects this medium had on the physician/patient relationship itself. Both the physician and the patient views correlated with and sometimes complemented each other. Both needed to be examined together even though most research at the time separated these two groups instead of interviewing them about their perceptions of the *same* relationship. That is, physician/patient dyads needed to be studied as they developed online and to be compared with face-to-face relationship development.

For the most part, there was relatively little written about the patient response to electronic messaging between physicians and patients, possibly because enough data was not available since the focus itself had largely been on physician adoption efforts and associated problems. Patient-centered care became a popular "catch phrase" in relationship literature, but patient-centered electronic messaging had barely been studied at all.

Most of the research done on the topic of patient care focused on the pre- rather than post-HITECH Act period (pre-2009). In one especially well-done, longitudinal study (Hsu, et al., 2005), *patient* perceptions were requested in the areas of (1) satisfaction with visit components, (2) comprehension of the visit, and (3) perceptions of the physician's use of the computer. Patients were tested during a precomputer period to determine a baseline, after the first month the computer was introduced, and then again seven months after the computer was introduced.

Results showed that all areas of satisfaction improved by seven months after the implementation, suggesting that the longer a physician and patient got used to the presence of the computer, the more likely they were to be satisfied. (This also could mean that the longer a physician used the computer, the better at using it and communicating with it he or she became.) Patients did not feel "crowded out" by the computer or challenged by time factors relating to the computer use. No significant changes were found in comprehension about post-visit needs or satisfaction with the physician's personal manner, level of concern for the patient, or level of listening. It is possible that these results existed due to the mere presence of the medium itself as being something "new" and intended to improve patient outcomes[63] rather than to the practical functionality of the medium. Patients might also have been impressed by the fact that the physicians' office was technologically up-to-date. Any of these reasons could be why the positive patient response to EHRs and computers in the medical visit were achieved.

More such studies needed to be conducted during and well after the transition from paper to electronic charts. Likewise, studies needed to be done on the secured patient portals themselves and the pre- versus post-perceptions of the physician/patient relationship as it developed over time without the electronic messaging component and then later with the component added in. Satisfaction levels needed to be compared on just this function of EHRs rather than on the physical presence of the computer itself. In short, this study on PCPs who were early adopters of computers in their practices needed to be repeated in multiple locations over a longer data collection period involving physicians who exhibited varied levels of familiarity with the computers and varied adoption attitudes.

Regrettably, only one Tracking Report (Tu, 2011) relevant to consumer technology and health information had come out from the Center for Studying HSC since 2008 (Tu & Cohen, 2008). Rather misleadingly, the 2008 report titled “Striking *Jump* in Consumers Seeking Health Care Information” was followed by the 2011 report titled “Surprising *Decline* in Consumers Seeking Health Information” (Italics added). Key in this decline was the 6% drop in American adults seeking information about personal health concerns (from 56% in 2007 to 50% in 2010). Specifically, the means for acquiring information went down for books, magazines, and newspapers (33% in 2007 to 18% in 2010), friends or relatives (31% to 29%), and TV or radio (16% to 10%). A decline also was found in the “any source” category (55% to 50%). The source consumers used the most above all other categories was the Internet (up from 31% in 2007 to 33% in 2010). All other forms of health information seeking scored considerably lower than the Internet. Tu noted that the demand for healthcare declined between 2007 and 2010 with the number of physician visits falling by 4% overall. This was attributed mainly to the economic downturn during this period, which affected patients’ willingness to pay for appointments in order to avoid higher insurance co-pays and overall out-of-pocket costs. Tu also argued that some consumers were frustrated with discrepancies between sources and/or with overly difficult reading materials that they found. Another possibility might be that patients felt confident in their primary source of information (the Internet) and reasoned that they did not have to rely on other sources to back their findings. Whatever the case, this research was one of the few related articles that came out from the patient perspective in this period.

In short, more research was needed on how patients had responded to EHRs, computers present in medical visits, and particularly the use of online electronic messaging. Research concerning the pre-HITECH Act overall was available, but little research from the patient perspective on media usage, perception of online communication, and efficaciousness of the medium itself in patient care had been done.

Physician Response Patterns

Research on physician responses within the changing medicological environment, however, was much more prevalent than patient-related research. Patients could not adopt the medium until their physicians offered the means for contacting them—unless of course they changed to a different physician who already was willing to make the transition. For the most part, current research focused on the physician's response to adoption within this ever-changing environment. This section first examines the physicians' overall response to EHR implementation since it was the system within which all other functionalities existed. Second, physician response to the newly implemented secured portals and the requirements for online communication with patients are discussed in light of this environment and needed research in this relatively new area of study.

Numerous studies explored the effects of EHRs on the medical interview from the perspective of the physician and suggested that the healthcare arena had been slow in adjusting to this change largely because it had been more driven by government mandates for Meaningful Use than by the physicians' inherent desire to improve physician/patient relationships and quality of care. As some argued (Guttmacher & Tiersten, 2014), the relationship between the clinician and patient was markedly challenged due to the constant need for data input into EHRs/computers during the office visit. This process severely limited the effectiveness of patient/practitioner communication and in turn quality of care. A study cited in the *New York Times* (Abelson & Creswell, 2014) involving a community hospital emergency room found that 43% of the practitioners' time was spent inputting data by "clicking" check boxes over 4,000 times within a ten-hour shift. Only 28% of their time was spent engaged in one-on-one communication directly with the patient.

As earlier noted, such mechanical challenges were quite cumbersome to the physician and, at times, offensive, distracting, or fundamentally annoying to the patient. In fact in a study presented in the Wolters Kluwer Health 2013 Physician Outlook Survey of more than 300 practicing physicians who were surveyed from the fields of primary care, family medicine, and internal medicine in April 2013, more than 80% of the physicians interviewed stated that they were struggling with spending sufficient time with patients due to dealing with impacts of the ACA and keeping up with the latest research in patient care (Wolters Kluwer Health). Only 4% of those interviewed felt that they had a "very positive impact" on their relationships with their patients as a result of the ACA. In fact, 21% stated that there was a "somewhat negative impact," while 11% stated that there was a "very negative impact." Likewise, "progress in HIT Adoption" was viewed by only 6% of physicians as having "significant progress" on improving patient relationships while 34% felt that there was "little progress" and 27% felt there was no progress at all. The impact of these changes, in short, seemed to be perceived as not improving patient relationships but rather harming them instead.

It is safe to say that most physicians greatly cared about their relationships with their patients. They did not want data entry during the office or emergency room visit to hinder the overall care of and relationship with their patients. Many argued that computer screens physically *interfered* with their ability to maintain eye contact, attention, and overall awareness of patient's ongoing verbal and especially nonverbal feedback during the visit. Physical observation is the hallmark of the physician/patient appointment. Online communication and electronic record-keeping during office visits often obstructed the interaction and became more of a hindrance than a benefit. Many simply were comfortable with how they had always interviewed patients and did not want the added burden of having to type their own notes or search through a list of check boxes to help them diagnose their patients' complaints.[64]

Even with the use of medical scribes, who are professionals who assist the physician by inputting data during the medical visit, there still was slowed input (waiting for the assistant to transcribe the information) and distraction (by the mere presence of an additional person in the room and the frequent talking to the scribe instead of the patient).[65] Although the incorporation of scribes had been accepted overall in the medical community (Lewis, 2013), challenges remained in that physicians, patients, and scribes adjusted to this altered communication environment. Physicians saw scribes as a viable option to their struggle to keep up with data input demands, lack of eye contact with patients, and increased pressure to see more patients in shorter time allotments (especially in practices employed by independent, for-profit institutions who often placed pressure on the practitioner to see X number of patients per time slot in order to meet rising costs and patient demand). It was a vicious cycle as the need for data entry in electronic records had led to a greater need for help during the office visit while few qualified, trained scribes even existed to meet this demand. Most scribe training programs across the country were not standardized, and few, if any, had been endorsed by the American Medical Society.[66] In fact many scribes were not formally trained as such but rather were medical students, nurses, medical secretaries, and assistants who knew medical terminology, were placed in the position, and trained by the physician "on-the-job." In short, early adopters of scribes and of EHRs in general may have chosen to do so prior to government mandates because they felt this change was an acceptable, realistic "way of the future" or because they simply liked technology and saw it as a benefit to their practices. These, however, had been the exception rather than the rule.[67]

This struggle to adjust to this ongoing challenge within the medicological environment had created an unstable, uneasy state of flux for those who wished to continue practicing medicine. As with any change, an adjustment period took place to respond to the equilibrium brought on by these changes. The question was, did people want to make this adjustment within the system, or did they simply want to leave the system altogether? Surprisingly, many physicians, particularly those who were approaching retirement age, had opted to stop practicing medicine rather than meet the governmental mandates. They entered medicine with an anticipated set of rules and behaviors; and those expectations were significantly altered. Challenges associated with learning how to use new media (as some may never have even learned to use the computer let alone typed on a keyboard), the costs involved in purchasing new equipment and training their staff, and the stress on their existing patients who themselves might have been aging and basically content with the way things "have always been"—all had influenced the willingness of some physicians to adopt EHRs and online communication.

Evidence of this resistance was found anecdotally (as in the chapter 4 interviews with rural physicians), but it was also supported by national surveys of physician populations. According to the Wolters Kluwer Health 2013 Physician Outlook Survey (Wolters Kluwer Health), more than one-third of physicians said that they planned to leave their practice within the next two years including 15% who were "very likely" to do so. Among all physicians surveyed, the main reasons for leaving was that it was "hard to make practice profitable" (29% of those surveyed) and it was time to retire (25% of those surveyed). This meant that out of the 300 practicing physicians surveyed in the field of primary care, over half were leaning toward retiring or quitting their office practice. Ironically, the most needed specialty in the country was losing the highest number of physicians.

In fact, according to a March 18, 2014, report by the Heritage Foundation (Anderson A., 2014) titled "The Impact of the Affordable Care Act on the Health Care Workforce," an estimated thirty million Americans were expected to acquire health insurance as a result of the ACA with an estimated 190 million hours of paperwork imposed annually on the healthcare system and related businesses per year. The fear was how this system would handle such a huge influx of work by an industry already challenged by physician shortages and overall lack of experience in dealing with such a change.

The medicological environment had been severely challenged by this situation. In Anderson's state-by-state report on the numbers of available PCPs, nurse practitioners, and physicians' assistants, the anticipated demand for personnel across all state lines revealed a frighteningly dire need for more primary care practitioners and support personnel. When coupling this with the apparent decline in number of physicians desiring to continue practicing medicine in the United States, the problem appeared almost insurmountable. The question was, could the medicological environment respond to the increasing need for patient care when so many more patients had entered the system as a result of the ACA and when so many primary physicians planned to leave their practices? Could the system return to a state of equilibrium of standard patient care when such additional demands were being placed on it from outside political, economic, and social forces? The situation was about to result in a very bleak future for medicine unless the medicological environment somehow readjusted in an effort to accommodate such a decline of cooperating and/or participating physicians. A hugely complex set of conflicting forces had to be readjusted if an equilibrium (a fully functional healthcare system for patient treatment) was to be reached.

On May 14, 2014, Steven J. Stack, MD, Immediate Past Chairman of the Board of Trustees of the American Medical Association, made the following public statement:

> The American Medical Association (AMA) appreciates the changes proposed by the Centers for Medicare and Medicaid Services (CMS) and the Office of the National Coordinator for Health Information Technology (ONC) yesterday to make it easier for physicians to achieve Meaningful Use. However, our chief concern remains unaddressed and we worry that current requirements will slow the adoption of technology that will help coordinate care and improve quality and that many physicians will drop out of the Meaningful Use program if the current all-or-nothing approach remains in place. To date approximately twenty percent of eligible professionals—mostly physicians—have dropped out of the program and we expect this number to grow unless more changes are made. (American Medical Association, 2014)

In his statement, Dr. Stack noted the dwindling number of continuing participants in the Meaningful Use program, indicating a 20% drop from those that already had adopted EHRs.[68] Despite all the incentive initiatives, the public promotion of the HITECH Act, the burst of vendors of EHRs, the efforts of physicians and hospitals across the country scrambling to meet the Meaningful Use standards, and the exorbitant amount of money spent on vendor fees, software, training, and man-hours (not to mention stress); the adoption process remained in flux. There was the thought that no matter how much the physician population was forced into this transformation, it needed to take longer, be treated with more care, respond to further research findings, and take a step back before continuing to drive forward without enough foothold on the process. For the most part, EHRs were relatively new to most practices. Converting thousands of charts, training personnel, and learning how to navigate new systems and programs while still caring for patients was all great in theory but stressful, demanding, costly, and just plain difficult in real-life circumstances.

In response, the AMA, through Stack's statement, however, argued that EHRs were here to stay and most physicians were willing to take on this task for the good of their patients and healthcare in general. However, in order to maintain quality care and physician support, a delay was necessary. This request was heeded to some extent at other levels as there had been multiple delays setting back secured portal implementations (part of Stage Two Meaningful Use), the ICD-10 conversion process,[69] and EHR requirements for underserved areas. The medicological environment was bubbling with activity, but in order to encourage and not deter adoption, change was needed, figuratively speaking, to bubble at a "simmer" rather than a "boil."

In order to place the significance of this decrease into perspective, it was necessary to review the most recent adoption rates from the National Center for Health Statistics (NCHS) and Centers for Disease Control and Prevention (CDC). In a report dated January 2014 (Hsiao & Hing, January 2014), adoption of basic EHR systems by office-based physicians had been particularly evident in recent years with an increase of 21% from 2012 to 2013. In 2001, the adoption of any EHR system was at 18%, rising to 48% in 2009 and to 78% in 2014. This revealed the apparent push for implementation through the HITECH Act of 2009. In 2013, 48% of office-based physicians reported having a system that met the criteria for a basic system which was up from 11% in 2006. More specifically, 78% of office-based physicians used any type of EHR system which was up from 18% in 2001 while only 48% reported a system that met the criteria for a basic system which was up from 11% in 2006. There was a state-related variation as well with physicians with basic systems ranging from 21% in New Jersey to 83% in North Dakota. In 2013, 69% of office-based physicians stated that they planned to participate in Meaningful Use incentives but only about 13% of these reported that they both intended to participate and had EHR systems capable of supporting enough of the core set of objectives for meeting Meaningful Use. This data suggested the influence of the HITECH Act of 2009 and the continued incentive push for Meaningful Use in the years to follow. If physicians were really dropping out of the program as Stack argued, the rise in adoption still showed significant signs of surging upward based upon these most recent statistics from the CDC.

Perhaps the reason for Stack's concern had less to do with these positive number trends and more to do with what physicians were anecdotally saying about their satisfaction and comfort levels when attempting to meet EHR adoptions and Meaningful Use incentives. In a more recent RAND research study, surveys and semistructured interviews were conducted on thirty physician practices in six states concerning satisfaction levels (Friedberg et al., 2014). The results of this study revealed that physicians who had adopted EHRs and subsequent online communication requirements were not necessarily happy. Dissatisfaction with EHRs focused largely on "poor usability, time-consuming data entry, interference with face-to-face patient care, inefficient and less fulfilling work content, inability to exchange health information between EHR products, and degradation of clinical documentation." Some of these problems were more concerning to senior physicians and those who lacked scribes, transcriptions, and other support for data entry. There was also a complaint that EHRs were much more expensive than anticipated, which added to the financial concern as well. Interestingly, it was also found that some practices attempted to address these problems by adding scribes to the practice and employing "flow managers" to help physicians focus more on their professional skills and patient interaction than on the mechanics of the computer program.

This report brings attention to physician concerns that affected the medicological environment: financial stress on the practice, lack of quality time during patient interactions, and impending loss of decision-making control over who became a physician (changing medical school admission standards), how many entered into each subspecialty (residency program restrictions and demands for PCPs), what was deemed the highest paid professions (with questions about primary care historically being on the low end and subspecialties on the high end), what course curriculums prepared students for medical school (with humanities-based majors competing with science-based ones), and which professions were valued (social vs. hard science).[70] Perhaps the problem lay not only in the technology but in the unwavering demands relentlessly, uncontrollably, and forcibly placing stress on the system. Too intense or too frequent change in a previously comfortable, balanced system could lead to an explosion or, in this case, an implosion within an environment already suffering from the relentless demands from externally and internally bombarding forces. Simply put, physicians wanted to practice medicine, spend time with their patients, and utilize the professional skills they were trained to do. The medium—in this case, EHRs—affected the structure and function of the physician/patient interaction and in turn challenged the stability and quality of patient care.

Although EHRs were not developed solely for online patient interaction, they provided the means for this form of communication. They were the medium through which online communication took place. As a mandate, secured portals and required message exchange imposed a seemingly innocent yet transformative systemic change on the physician/patient dyad heretofore studied mainly from a face-to-face, relational perspective. Now all physician practices were being forced to comply with this form of communication. The government had not made it an option. Online physician/patient communication was here to stay.

A simple comparison with the telephone's introduction into physician practices shows the magnitude and novelty of how this particular "new" form of medical communication had been introduced into the field of medicine: As earlier discussed, the telephone transformed physicians' entire way of treating patients in that suddenly physicians could be contacted almost instantly, interruptions were possible, night "visits" were more easily made, and physical distance was no longer a limiting factor. Medical access became more synchronous instead of linear. "Visits" were still scheduled in specific time slots, but phone calls could interrupt those visits, allow for extra "free" advice, and invade the overall privacy of the physician at any time. The nature of the phone as a medium transformed the life of the physician and the convenience level of the patient; however, this transformation was a *gradual process*. As more and more people gained access to telephones and the cost of using them became increasingly more affordable, the physicians' offices also learned, over time, how to adapt to this transformative medium. Time made the transition less traumatic. The medicological environment had time to adjust to change.

Similarly, change also occurred with the introduction of the email and various forms of electronic messages. As people gained access to broadband, costs began to decline, accessibility increased especially with the use of smartphones, and fewer people were left out due to demographic differences. The Internet and email gradually became a part of everyone's daily life. The physician/patient correspondence through online messaging seemed to be for the most part left out. Invading a physician's email was commensurate with calling his or her private cell phone in the middle of the night. People simply did not do that. Emails remained a part of casual and even some professional interactions but were not typically a part of medical ones.

Beyond the notion of this initially protected communication space (a sort of "no-email zone"), the main difference between the implementation of the telephone and that of electronic messaging within the medical arena, was that of timing. The telephone slowly and naturally infiltrated the healthcare environment while online medical messaging was swiftly implemented into law with seemingly no preparedness by the medical community.[71] That is, physicians themselves could choose when to get a phone and how frequently they wanted to answer it. Regulations were not as formally established identifying how fast the phone had to be answered, when it had to be answered, or where it had to be located. Initially, rules were not established for emails either, other than the suggestions by Kane and Sands (Guidelines for the Clinical Use of Electronic Mail with Patients) in 1998 wherein they outlined best practices for medical interactions. Formal electronic messaging between physicians and patients at the time was more of a novelty than a norm; and, therefore, the rules at first were suggestions, not bound by law.

What made secured portals and electronic messages so transformative and different were the government mandates that *required* adoption of secured portals and online communication. Associated rules and regulations were formally outlined and developed into law by HIPAA, the Stimulus Act, and the ACA. The process of introducing this medium was neither gradual nor elective. As a result, the medicological environment was impinged upon, injected with requirements from various outside forces to impose a time-controlled change. Physicians and physician support systems like the AMA were fighting these changes. Political parties were objecting to various portions of "Obamacare" on the principle of it being dictated to the American people without their consent.[72] This transformation process was quite different from that which was experienced when the telephone was introduced. This time the adjustment to the new medium was an explicitly prescribed one which was determined by lawmakers, insurance companies, and the government itself.

The medicological environment at this particular point in time demonstrated how a previously dynamic yet stable system could be altered by a number of outside systems (political, social, economic, legal, etc.) which up to this point interacted with the healthcare system in a noninvasive, generally cooperative manner. Now all of a sudden, these systems began to direct action from the outside in, requiring change even before the system was ready and willing for change to occur. Outside forces were collectively altering the natural course of medium adoption within the typically slow-to-change healthcare arena. It was a point in time wherein healthcare was not standing alone as its own governing body (guided largely by the AMA and state-run bodies), adhering to the Hippocratic Oath and internal ethical standards of the scientific world. Rather it was driven by outside invading systems that imposed untested rules and laws on a resistant healthcare arena. Certainly, this was not to say that the American Medical Society and other internal governing bodies no longer were influential players within the system; but they were being acted upon and spending more time *reacting* to the change than *defining* the change.

In effect, the medicological environment exists as its own ecosystem functioning within its own fluid, yet open, boundaries. It is driven by ethical standards and laws. It is guided by basic human rights and moral obligations. Outside systems permeate the environment simply because those who exist within the healthcare arena also exist in other systems. That is, physicians are business leaders, hospital administrators, political candidates, and stockholders. Physicians are patients too. There is and always has been overlap between the systems. Now, however, the protective borders of this environment had been challenged by the abrupt, forceful intrusion of government mandates.

Indeed, the words "mandates," "laws," and "force" sound quite strong and imposing. They were meant to because this transition had been all but gradual, and the healthcare profession had all but accepted these changes with open arms. Granted, some had agreed to many or even most of the changes. The argument herein is not about whether this change should have come about or even whether or not it was justified. Rather the argument is that this change simply had occurred in a manner uncharacteristic of the more deliberate and systematic patterns of change in the past. Yet, like electricity, the switch had been "turned on" and there seemed to be no shutting it off. Physicians and hospitals had already spent billions of dollars on EHR systems including new space to store data, new equipment, and a great deal of training.[73] Change had been introduced into the environment, the equilibrium had been upset, and now the system had to respond by readjusting and returning to some sort of state of equilibrium.

The medium itself drove the capability and usage of the online interactive system. Prior to this medium, the physician/patient dyad either used unsecured media such as AOL, Yahoo, and Gmail to exchange messages or the physician proactively purchased secured venues for message transmission which at the time were unpopular, expensive, and relatively untested. The drive toward EHR implementation popularized this relatively new form of physician/patient interaction. The secured portals and resulting electronic medical messaging became a sort of byproduct of EHR requirements. Without understanding the impact of EHRs within the overall system, electronic messaging would not have been as influential a factor.

THE MEDICOLOGICAL ENVIRONMENTS AS A FIELD OF STUDY

There are many ways of assessing the effectiveness of these communication patterns, but thus far too few research studies examined them from a multi-methodological approach. That is, little had been done to measure and assess the effectiveness of this means of communicating, partly because of the newness of this form of communicating and partly because the focus had been so heavily directed toward the effectiveness of the *EHR as a medium* and not on the *communication* within the secured portals. A wealth of earlier research focused on this medium, and rightly so, since it was the single most significant technological change in medical communication since the telephone. It made sense to focus initial research on physician and patient response to this medium considering their economic challenges, broadband access, equality among various patient demographic groups, and overall physician willingness to adopt. Many large research institutions collected a wide variety of information on trends and responses from both the physician and patient communities. EHRs were the focus because they were the starting point of this entire transition from paper to electronic charts and messaging. The electronic record hoped to afford interoperability between systems; transmission of information across practices, states, and even countries; and broad database analysis of trends anywhere from treatments to disease patterns across the world.

The most fascinating aspect of this EHR capability from a communication relational standpoint is electronic medical message transmission. Therefore, it is the purpose of this chapter to shed light on where the electronic medical message fit into the medicological environment, how it might help to shape future transitions in healthcare, why it was important to this process of transformation, and how it should be studied. This phenomenological environment, characterized by interconnectivity, interdependency, and systemic openness, represents influences from a wide variety of outside systems having acted upon this open system in a uniquely influential manner. One piece intricately and expansively affects every other part. Like a group of planets in a solar system, this environment works, changes, adjusts, adapts, readjusts, and reacts as an interlocking, unified, working whole.

The purpose of subsequent chapters is to sample and suggest a wide variety of approaches to studying this environment from oral history interviews, focus groups, surveys, qualitative and quantitative analyses, and even computer data mining. It is argued that no single study, no single lens can capture nor fully comprehend the complexity of this environment at any given point in time as the environment is constantly adapting and responding to change. The following research perspective attempts to provide a sample of studies that begin to explore the intricacies of this environment and to suggest possible research questions and directions for the future.

NOTES

1. See chapter 2, on Meaningful Use.

2. The term "medicological" is not new per se. It historically refers to medical ethical issues associated with such items as nursing home regulations (Vaca, Vaca, & Daake, 1998), trauma cases (Hirsh, 1998), nonpayment as grounds for transfer (Lasky & Maloney, 1978), and informed consent (*Medicological: What a Doctor Should Tell?*, 1984; Yate, 2000). This term, though, has not typically been used and has not encompassed the wide variety of disciplines and influences as the "medicological environment" is intended to include in this book.

3. When naming "legal/political," it is intended to emphasize these areas in their specific importance to this particular analysis; but it is not intended to exclude every other possible influence and field of study that could be factored into this research analysis.

4. This calls to mind Alfred Korzybski's *Science and Sanity* (1933) and S. I. Hayakawa's *Language in Action* (1941) in which all interactants (herein referring to the multiple participants within each interaction) bring with them a dynamically experienced "self." This self includes four simultaneously moving parts or spheres of influence: the self-moving (physical movement as well as internal movement), electro-chemical (all aspects of the body that function above and below the level of awareness), thinking (all conscious, subconscious, and unconscious aspects of thought), and feeling (emotional) aspects of self. Likewise, each of these are interactively present on three levels: past experiences, present perceptions, and future expectations. The complexity, therefore, of all interactions are quite significant, especially when considering the multiple interactants that engage within a communication setting both as active intractants and as bystanders (those present in the interaction who influence others by their mere presence but are not said to be engaged actively in the interaction at hand). When considering so much going on within any given interaction, it is amazing that anyone can communicate or share meaning at all. And yet meaning does appear to be shared as interactants continue to engage, sharing language and an apparent level of coordinated meaning that drives the transaction forward. (Indeed, perhaps, the possibility of so many converging perspectives and varied past experiences of word meaning is why so much miscommunication exists.) Specifically, however, this broadens the scope and concern for medical interactions when past education and experience may be widely different between the various interactants (as in physicians and patients, for example).

5. See the www.cms.gov website: http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/PaymentAdj_HardshipExcepTipSheetforEP.pdf pages 3–4. This government document showed how "hardships" were recognized by the government and helped alleviate some of the implementation woes of underserved areas which had little Internet access or eligibility for EHR contracts.

6. Portions of this segment are adapted from a previously published work by Wieczorek (from Telegraph to E-Mail: Preserving the Doctor-Patient Relationship in a High-Tech Environment, 2010).

7. All forms of media merge as they begin to share functionality. In this case, the smartphone has computer skills in that it can send messages, type documents, email, and use social media just as the computer can. The computer can do all of these as well as place phone calls. The blending of these in some ways make them almost the same. The medicological environment appears to be so overlapping that a newly emerging entity exists in technology. This too is a concept based upon Marshall McLuhan's perspective wherein multiple technologies are meshed into a network of interlocking parts.

8. The full discussion of laws, acts, and programs associated with this medium is found in chapter 2.

9. The term “eVisit” was previously used by the University of Pittsburgh Medical Center’s (UPMC) original HealthTrak EHRs when “seeing” patients through electronic means for actual paid office visits. See chapter 5 for a full description of the eVisit at this location.

10. The telemedical industry surged as telerobotic surgery even in rural areas became commonly advertised on billboards and as visual physicians’ visits that linked remote areas of the Hawaiian Islands together almost instantly (Berry & Dolan, 2008). The focus here on electronic messages was not meant to upstage these advancements; rather, it was to say that the transmission of these messages, through the Internet, enabled this wave of more advanced medical monitoring systems and even robotic surgery across countries to become a reality (Telerobotics Brings Surgical Skills to Remote Communities: Canadian Programme Allows Surgeons to do Bowel Resections 400 km Away, 2003).

11. It must be noted that the Kane and Sands guidelines of 1998 referred specifically to email, but their information applies directly to relatively more recent forms of social media including text messaging, Facebook messaging, and Twitter. The point is that basically all online and texting communication exchanged through electronic means allowed for the same spontaneity, immediate response, permanence of records, and linear communication and discrete, digital correspondence. Video exchanges through such things as FaceTime or Skype were less permanent and more continuous (analog). These forms of communication were not yet part of mainstream communication in 1998. However, as online video communication emerged between physicians and patients, that conversation had the potential of being recorded and made more permanent as well. Again, technology changed not only from year to year but month to month and day to day as well.

12. This stood as one of the most important and forward-looking discourses of the time preceding the secured portals. It predicted the need for encrypting such messages well before the medium existed. As a keynote speaker for the West Virginia Chapter of the American College of Surgeons on May 9, 2009, I warned physicians to pay for the service to have their individual email systems encrypted. At that time, I recall it cost about $40 per year. Very soon after that the encryption became automatically programmed into the secured portals, making this aspect of security no longer an issue in medical electronic message exchange—providing, of course, that the physicians and patients used the portal and not private emails. Later, on June 23, 2013, I talked to surgical residents at West Virginia University Medical School and we discussed the new problem with secured messaging which had to do with communication through unencrypted *text* messages. At that point, there were no effective, popular means for messaging outside of the secured portals for use with texting between physicians. These examples revealed the level of continued applicability of this seminal work by the AMIA as reported by Kane and Sands.

13. All messages exchanged electronically that did not use encrypted services were automatically in violation of the HIPAA laws and regulations. Physicians and patients did make such exchanges; but they were in violation of the laws designed to protect the privacy of the patient and were subject to strict fines. See chapter 2 for further information regarding HIPAA laws and privacy.

14. For this reason, psychiatric services were becoming increasingly more popular online not only because of the round-the-clock access but also because of the perceived convenience for both the patient and the physician. See http://www.ihealthbeat.org/articles/2014/5/8/study-telepsychiatry-program-improves-patient-outcomes-in-nc from iHealthBeat for an excellent example of this service with psychiatric patients in North Carolina. Guidelines for this practice may be found at http://www.americantelemed.org/docs/default-source/standards/practice-guidelines-for-videoconferencing-based-telemental-health.pdf or in the Practice Guidelines for Videoconferencing-Based Telemental Health (American Telemedicine Association: Telemental Health Standards and Guidelines Working Group, 2009).

15. As learned early on, if the experience was a "crisis" or medical emergency, it had to be dealt with immediately through a phone call or trip to the emergency room. As discussed later, electronic messages through email were not designed for this. Some have argued that tone of voice can be recognized through emails with emoticons and the words used. This was thought to be true, but emails did not afford the visual aspect of a face-to-face interaction.

16. In a 2009 personal interview with Drs. Wayne and James White, they discussed their very early transition into electronic health records when they left a previous practice and opened a new office. Because of the magnitude of the charts, they decided to convert everything by scanning all documents and then never again creating paper charts in their office. This process at first was more of an electronic conversion than an EHR. That is, the hard copy was copied into electronic copy making the potentially destructible paper charts indestructible electronic ones. For more information on the White Medical Associates' practice conversion and similar interviews, see chapter 4.

17. In the case of the secured portals, when electronic messages come into these portals, they are automatically recorded directly into the electronic chart. Those systems that may not be designed in this manner still maintain the permanent record of the electronic message through the "history" of the patient/physician message. When combined with cloud computing with off-site servers, the records maintain a permanence now even greater than before.

18. Again, the focus here is only on written online communication and not visual interactions. The latter will, however, be considered later in this book concerning eVisits. See chapter 5.

19. For this very reason, some voiced concern over the use of electronic interactions particularly when dealing with psychiatric patients. As of September 16, 2013, the Centers for Medicare and Medicaid Services (CMS) had commissioned the National Academy of Sciences to research and implement procedures for adding more social and behavioral data into EHRs in order to meet the growing demands of Stage Three Meaningful Use. See http://www.ihealthbeat.org/articles/2013/9/16/cms-commissions-study-on-including-social-behavioral-health-in-ehrs.

20. See chapter 2 for information on the HIPAA laws and regulations associated with recording and PHI privacy regulations.

21. This perhaps was a precursor to the "eVisit" of HealthTrak. See chapter 5.

22. A story presented to me by a student in my fall 2012 Medical Communication class at the University of Pittsburgh at Johnstown supported this point. She was

presenting an oral history report about her grandmother's experience with her physician. The physician stated that if she was going to bring in website materials to the exam room, then the patient had no business needing to see a physician. The physician immediately walked out of the room, indignant over the fact that the patient was suggesting medical information from the Internet for his consideration.

23. It is not the purpose herein to discuss the legal rights of patients to their own medical or electronic charts. However, the medium (EHRs) afforded an increased visibility of information that was once owned only by the physician. Earlier longitudinal research by the Robert Wood Johnson Foundation involved "open notes" for electronic records and examined the change such access might have had in patient care. See http://www.rwjf.org/en/research-publications/find-rwjf-research/2010/07/open-notes.html (Delbanco et al., 2010).

24. For instance, in my husband's family practice office, which I managed, we had applied for Stage Two Meaningful Use with the patient portal, Medfusion. Since the minimum requirement for patients to be using electronic messages was set, the portal itself sent out automatic emails with information to the patient. Upon opening these emails and perhaps responding to the information, the patient data was automatically recorded within the system, indicating how many patients were actively communicating through the portal and in turn helping to meet the Meaningful Use requirements. This is one way the systems were helping practices and hospitals reach the required government standards.

25. See http://mail2web.com/blog/2011/05/smartphone-revolution-growth-smartphones-exchange-activesync/ for a list of landmarks of the smartphone. It is important to note that "Simon" was not distributed widely at this early point in time but acted more like a protocol, though it was purchasable at the then quite unaffordable and impractical price of $899.

26. The term "smartphone" was patented in 1997, right around the time when guidelines for online communication were coming into place. See Kane & Sands (1998) for guidelines. The patient information may be found at U.S. Patent #3,812,296/5-21-1974 (*Apparatus for Generating and Transmitting Digital Information*), U.S. Patent #3,727,003/4-10-1973 (*Decoding and Display Apparatus for Groups of Pulse Trains*), U.S. Patent #3,842,208/10-15-1974 (*Sensor Monitoring Device*). The first smartphone was the GS88 Penelope marketed to the general public in 1997. See www.stockholmsartphone.org/history/.

27. "LG" is the company that produced Android. The acronym stands for "Life's Good."

28. For an earlier chart comparing Android and iPhone popularity and development, go to http://www.ijailbreak.com/news/iphone-or-android-phone-first-infographic/.

29. Much controversial publicity surfaced surrounding the Lifeline services for what many called "Obama phones." As stated in *The Washington Examiner* (Spiering, 2012), this program actually started in 1984 "as a means of subsidizing landline phone services for low income Americans." In 2008, the program expanded to include cell phones. This resulted in a cost increase from $772 million in 2008 to $1.6 billion by 2011 with approximately 269,000 wireless Lifeline subscribers. All users now could potentially access text messaging and Internet services readily and easily through cell phone service. The website, Obamaphone.net, leads to the website

https://qlinkwireless.com/, which shows how one could obtain this "free" cell phone service that was funded by government-collected telecommunication fees, paid for by consumers.

30. *The Doctor*, an excellent full-length movie starring William Hurt, exemplifies how physicians can be submitted to the very same treatment and procedures as their own patients (Haines, 1991). Physicians when acting as patients no longer are in the "privileged position" of knowledge and control. It would be interesting to see how this same concept would be treated from an electronic communication standpoint. For instance, how would physicians speak to physicians who are communicating online for medical advice? Would the interaction be the same or different from the oral, face-to-face exchange? *The Doctor* suggests that it would in fact still be different for the physician acting as patient. The use of medical terminology in the messages may be more prevalent (as they are in the film), but the interactions themselves would likely be affected strongly by the change of roles.

31. Of course, internal forces such as physicians desiring adoption of a new technology or patients requesting that technology also can affect change.

32. As noted previously, "hardship" was a term used in reference to physician practices and hospitals that could not be financially penalized by the government when the ability to meet the Meaningful Use mandates was impossible or impractical for reasons beyond the control of the physician/hospital. See www.cms.gov website at http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/PaymentAdj_HardshipExcepTipSheetforEP.pdf pages 3–4.

33. No such study singled out physicians from the general population to see if they were higher or lower adopters at this early point in time. Later studies did suggest the parallel of education with higher adoption levels, but physicians for the most part were not singled out as the population of interest. See below for later studies considering such correlations.

34. As is later shown, both in the literature and in the real-life example of UPMC HealthTrak discussed below, reimbursements for virtual written and online "eVisits" by 2015 were reimbursed by numerous insurance companies as well as UPMC itself.

35. See http://www.ama-assn.org/ama/pub/physician-resources/medical-ethics/code-medical-ethics/opinion5026.pag to review this electronic source. It is also available through pdf format from the same site.

36. Of course, it is not possible to completely separate information-giving messages from relationship-building ones within an email. The manner in which one provides information may in fact simultaneously help build a relationship while a relationship-building conversation (such as encouraging words of hope) might very well provide information (such as there *is* still hope to give).

37. This may seem overly ideal as many physicians question the interference of government policies, insurance company restrictions, and hospital "bottom lines" in that they prevent physicians from practicing in the best interest of the patient. Some argue, for instance, that a patient needs an MRI, CT Scan, special blood test, or brand drug without having to go through preliminary tests or drugs that the physician feel will not be as effective. These mandates have been said to interfere with the physicians' right to practice in a way that puts restrictions on them by people who are not necessarily physicians (such as insurance companies requiring trials of other drugs when the desired

first choice may not be a generic form of that medication). The "business" of medicine can in fact be quite different from the "practice" of medicine. In my personal dealings with physicians, I have witnessed such discussions on many occasions both at national conferences and in private dinner parties. The problem to physicians is real and worthy of concern. See also personal interviews with physicians in chapter 4.

38. This topic and perspective were discussed with Ronald M. Epstein, MD, during a medical workshop and personal interview at the University of Pittsburgh Medical Center on November 19, 2008. Currently Dr. Epstein is Professor of Family Medicine, Psychiatry, Oncology, and Nursing at the University of Rochester Medical Center. Board Certified in Family Medicine, Hospice, and Palliative Medicine, he acts as a clinician, medical educator, and researcher. As the Director of the Center for Communication and Disparities Research, he strives toward the goal of improving communication between clinicians, patients, and caretakers. The following link may be helpful: http://www.urmc.rochester.edu/people/20374457-ronald-m-epstein. Dr. Epstein believes that the physician practice is first and foremost a patient-centered practice. Effective communication skills are both demonstrated and taught by the physician in an effort to improve patient-participatory care.

39. Many articles flooded the *NY Times* concerning the Affordable Care Act and HITECH Act since 2009 through 2015 in particular. Opinions ran from concern for "death panels" to praise for "equal opportunity" of care for all. Some saw the fiscal and economic consequences as positive and some as negative. Both sides of the argument were heated. In running a search on this topic, well over 5,000 articles were identified in the *NY Times* alone. One rather summative blog/article in *Economix* by Phillip Swagel, a professor at the School of Public Policy at the University of Maryland and previous Assistant Secretary for Economic Policy at the Treasury Department (2006–2009), called "The Hurdles to Success for the Affordable Care Act" summarized these views quite well. Go to http://economix.blogs.nytimes.com/2013/10/14/the-hurdles-to-success-for-the-affordable-care-act/.

40. See http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/index.html.

41. As noted earlier, the startup costs for my husband's practice (J. Eric Wieczorek, MD) was about $70,000 through the vendor, Allscripts. Costs surmounted as each update of software was added and each new requirement for Meaningful Use started.

42. For more information see http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/PaymentAdj_HardshipExcepTipSheetforEP.pdf. This list shows all aspects of the "hardship" argument and shows how many older physicians could elect simply to quit rather than make the change to EHRs or take these reimbursement cuts for their services.

43. Certainly, the acronym was catchy, but it did not readily emphasize health as much as technology. It could have been called "HealthTech Act," but it was not. The attraction to "high technology" was greater and more far-reaching than mere health technology. Much thought had to have been put into this acronym, and its implications surely were intentional.

44. I too have been "in the business" over the past thirty-four years as a personnel marketing director of a hospital (1986–1988), the managing director of my husband's

family practice office (1988–present), and executive director of the Cambria-Somerset Education of Healthcare Professionals, Incorporated (2012–2015). In no uncertain terms, all of my positions had been about health *and* economics. On Friday, June 27, 2014, I received an email from Vice President Wayne Best, chief economist for VISA Corporation. He was looking at financial reports for the first quarter of 2014 and noticed a significant decline in healthcare spending by patient consumers. He asked what my opinion was on why this had happened "from the ground" in order that he might have some personal insight in his professional projections. Indeed, healthcare is a business and not "just" a means for helping people with their health problems.

45. One of the more controversial programs that received vast attention was Lifeline, which was technically started during the Ronald Reagan administration. The attention, however, emerged from an anonymous email that began circulating in 2009 and warned that free "Obama phones" were being handed out to welfare recipients along with seventy minutes of free service a month. This contributed to widespread conspiracy theories supported by talk radio shows, blogs, and TV talk shows alike. See the *Washington Post* article by Tumulty (2013) at www.washingtonpost.com/politics/obama-phones-subsidy-program-draws-new-scrutiny-on-the-hill/2013/04/09/50699d04-a061-11e2-be47-b44febada3a8_story.html.

46. See chapter 4 for oral history interviews and related references concerning this point of view.

47. See chapter 5 on the HealthTrak study in which this medical power of attorney or legal online advocate is quite commonly used for those in older age groups who either do not have access to a computer, do not know how or are not able to use one, or are not willing to use one.

48. This activity level was very important when determining the validity of this number. In the footnote of this Pew Research Report, the following was stated: "In the latest Pew Internet survey, Internet users are defined as those who say 'yes' to at least one of the following three questions: 'Do you use the Internet, at least occasionally?' OR 'Do you send or receive email, at least occasionally?' OR 'Do you access the Internet on a cell phone, tablet or other mobile handheld device, at least occasionally?' From January 2005 through February 2012, an Internet user was defined as someone who said 'yes' to at least one of two questions: 'Do you use the Internet, at least occasionally?' OR 'Do you send or receive email, at least occasionally?' When compared with the old definition, the new definition resulted in a one-percentage-point increase for those ages 65 and older (not a significant difference). Prior to January 2005, an Internet user was someone who said, 'yes to one question: 'Do you ever go online to access the Internet or World Wide Web or to send and receive email?'" This showed a tightening in how this data was being acquired and, hopefully, allowed for a more representational sample of Internet usage.

49. Fox and Rainie (2014) further stated, "Indeed, for many, it became synonymous with the Internet, even though that is not technically the case. The Internet is rules (protocols) that enable computer networks to communicate with each other. The Web is a service that uses the network to allow computers to access files and pages that are hosted on other computers. Other applications that are different from the Web also exploit the Internet's architecture to facilitate such things as email, some kinds

of instant messaging, and peer-to-peer activities like Internet phone calling through services like Skype or file sharing through torrent services." This helped explain the interaction between these various means for communicating through the "architecture" of the Internet.

50. This supports why doing demographic studies are so valuable in hospital marketing analyses. Not all physician groups or solo practitioners have access or funding to do such studies, so it is vitally important that such information be considered on a personal level as best as possible when monitoring electronic medical communication with patients of such varied demographic backgrounds.

51. This entire notion of perceptions affecting how people used technology calls to mind my mother's first introduction to "electric hair curlers." She was afraid if my hair was a little wet when using them, I might get electrocuted as if electricity stayed in the curlers the same way heat did. Others later worried that food cooked in the microwave would create radioactive poisoning or residue in the foods. This also echoes the fears of the cell phone/smartphone for instance. People questioned whether it would alter the brain due to the electronic wave transmissions. People worried that the laptop would cause uterine, testicular, or prostate cancer. Of course, there could be some truth to this if in fact such "waves" could interfere with cell formation and growth. However, the fear itself was what made this whole new technology reminiscent of electricity and the Carolyn Marvin notion of electrical textuality substituted with Internet Textuality. At best, perhaps the relationship was at least similar in how far-reaching and consequential the introduction of the Internet was on this ever-transforming society. The medicological environment indeed was affecting and affected by this medium through the mandatory governmental regulations requiring EHRs and secured portals for electronic medical interactions online, that is, emails.

52. The specific prompt was as follows: "Most significant impacts of the Internet — This is an open-ended question allowing you to make your own prediction about the role of the Internet in people's lives in 2025 and the impact it will have on social, economic and political processes. Good and/or bad, what do you expect to be the most significant overall impacts of our uses of the Internet on humanity between now and 2025?" (Anderson & Rainie, 2014, p. 20)

53. The HITECH Act originally included a "breach reporting requirement" in the interim final breach notification rule in September 2009; but it was not amended and included in the HIPAA Omnibus Rule until it went into effect in March 2013. This left plenty of time for hackers, computer lifters, and nosy employees to lift information from unassuming users like physicians and hospital personnel. Previously, patient records were kept in the basement of the hospital or in a private room in a physician's office, relatively well guarded and away from public traffic. Now, however, with a push of a button from the privacy of one's home, the skilled hacker could lift such information frighteningly easily, especially prior to 2013.

54. John Savage, a research scientist from Brown University, stated, "The Internet needs to be studied as a medium. It deserves the kind of treatment that Marshall McLuhan gave to modern communications during its infancy. Nations around the world need to understand its potential and pitfalls so that we can collectively improve our cultures and economies will avoiding unnecessary disagreements and conflicts.

For example, we are all very much aware that modernization is creating great stresses in nations that have lived by a religious code that is at odds with the prevailing cultures in other nations. These stresses need to be understood and, if possible, mediated so that nations can learn to respect differences in their cultures while not insisting that all adhere to one culture" (Anderson & Rainie, 2014).

55. Patrick Tucker, editor at large for *The Futurist* magazine, wrote *The Naked Future: What Happens in a World that Anticipates Your Every Move?* (2014), which talked about how massive data banks will transform every aspect of our regular lives from predicting the next earthquake to transforming individualized learning in real time. Everything can be predicted and calculated out with risk factors and probabilities at a level beyond current standards due to continuous streams of data being gathered, analyzed, and used for determining the future. Our future becomes naked, exposed, calculated, and predictable. Perhaps this can be true; but there are always odds against the inevitable. Perfect confidence in predicting anything from hurricanes to flat tires can always be potentially wrong. At best, all we have are probabilities—better and better ones with more and more accurate and robust data—but probabilities nonetheless.

56. See CDC summary: https://www.cdc.gov/ehrmeaningfuluse/timeline.html and a professional rendition: https://www.beckershospitalreview.com/healthcare-information-technology/cmio-musings-is-meaningful-use-still-meaningful.html.

57. Usage rates were calculated and recorded automatically within EHR systems in order that the data could be transmitted to health insurance companies and government offices. This data was used to help determine whether the amount and type of use merited the designation of "Meaningful Use." Likewise, many insurance companies based their rate of reimbursement per patient on factors associated with the extent of such usage. There were many different levels and types of usage criteria that were present in order to determine how much reimbursement per patient would be awarded from an insurance and even governmental perspective (Medicaid for instance). Although the focus of this manuscript is on electronic messaging, it must be kept in mind that many other coding criteria associated with patient care were of primary concern in determining overall reimbursement rates.

58. I make this assumption based upon personal experience in interviewing physicians (chapter 4) and in talking to my husband, J. Eric Wieczorek, MD, frequently about how he discussed this online relationship with patients. In turn, since his practice was in a rural community, his comments about the medium were shared with me not only by him but by the patients themselves who talked about what he said and about how they felt. *The medium as it developed became a social entity, a topic of discussion.*

59. In 2010, I spent a few weeks in Europe speaking to various groups on the topic of technology and communication. One of my talks was at Utrecht Hospital in the Netherlands. There I was amazed by the presence of computers throughout the hospital, particularly in the general corridors of the hospital lobby. Patients were using them actively. When I inquired about this, I was told by Annelies Hetharia, team leader of Patient Communication and Patient Service at UMC Utrecht and coordinator of my presentation series at Utrecht, that over 95% of the population in

her hospital system at that time used the Internet and accepted online communication with their hospital and patients as a norm. Although these statistics seemed startling to me, during a subsequent presentation and discussion with electronic communication experts in that region, I was told that since the Netherlands is a relatively small country, the means for developing such expansive communication was vital to their system. In other words, the medicological environment in that region had already made the adjustment to the technology of online communication within the healthcare profession. I predict that this may also be the case with other countries including the United States over time as the environment accepts and adapts to change, ever reaching toward an equilibrium that acknowledges online communication within the healthcare profession as "normal," useful, and perhaps even commonplace.

60. This of course is an ideal list. The concept of "equality" was often rightfully challenged when looking at the physician/patient relationship due to socioeconomic factors, education, and information security—to name a few. However, when an email was transmitted from one person to the other, there seemed to be greater equality (1) because the patient had the right to contact the physician at any time and from anyplace that had Internet and (2) because the patient could write as much or as little as desired. Point 2, however, was not always the case. At times, some portals (such as the one discussed in chapter 5 in the HealthTrak study) controlled how many words the patient could use in a response, but they did not control the number of words the physician used. This showed a definite inequality. Therefore, the relationship on the surface appeared to be more equal due to medium availability and physician/patient access, but the medium itself, which was managed by the physician could also be controlled by him or her in how many characters the patient might be allowed to use per message or even how promptly the physician responded.

61. It could be argued that physicians overlook the electronic messaging portion of Stage Two Meaningful Use requirements. After all, there are a total of fifteen core objectives and buried within these requirements is the mandate for physician/patient electronic messaging. Online communication is not front and center in all the instructional literature but rather is a part of many other requirements. However, without the incorporation of secured portal messaging between physicians and patients, the practice cannot achieve Meaningful Use.

62. My dentist responded to emails even in the middle of the night. I was alarmed when I sent him a message at about 3:00 a.m. when I remembered to tell him something about a problem I was having with a recent procedure. To my amazement, he responded at that hour of the night. He said the "ring" on his phone awakened him, and he was curious to see what the message was. In that case I certainly invaded his sleep, and the message was as instantaneous as a phone call in the middle of the night. Emails may not always be "instant," but they have the potential to be, and because of this, they are a unique form of message transmission considering access and delivery.

63. Sometimes change itself is the root cause of positive response from subjects. That is, the fact that the office cared enough to update itself might have been the real reason for the positive response and not the medium of the computer itself.

64. EHRs contained within their program menus or lists. These menus acted as a check system for making sure that the physician and/or nurse covered all the

necessary factors having to do with treating the patient for each illness or problem presented at the office visit. The effective use of these check boxes was assessed by insurance companies which reviewed the physician notes to see what was being covered and to determine whether enough had been examined on the patient to warrant a specific charge level. If the physician put down more diagnoses, for instance, the patient could be charged a higher rate per visit since the physician technically covered more things. These check boxes sometimes complicated the visit, especially for PCPs who had wide variability between types of patient problems. The more problem types that were listed, the more check lists needed to be included, which meant the more time that the physician had to spend with the patient (and the more he or she could charge). Although some felt these lists were helpful, others felt they inhibited the natural flow of the medical interview, restricted the physician line of questioning, included unnecessary categories and exhaustive lists, took up considerable time, distracted the physician from the patient's nonverbal responses, and even decreased the care of the patient.

65. I have had personal experience with scribes in multiple practices, and I have felt that my privacy has been violated within the parameters of the physician/patient relationship. I do not feel as comfortable disclosing information to the physician and feel distracted by the additional person's presence in the room. Likewise, I find that the physician spends a lot more time directing and talking to the scribe to make sure things are documented correctly than he or she spends with me as the patient.

66. Scribe America at www.scribeamerica.com provides services offering "Full Turn Key" professional medical scribe programs for clients. On their website, they claim to "recruit, hire, train, manage, monitor and deliver a medical scribe program that is of the highest quality and un-parallel to any other in the industry." I have personally explored this program as manager of my husband's medical practice and found that they deal with hospitals and larger practices. Wheeling Hospital of Wheeling, West Virginia, utilized this program to train emergency department (ED) personnel to help improve efficiency of ED care. In speaking with the director of this program, I found that Scribe America effectively trained personnel and then created a body of personnel who likewise became trainers. This allowed for the program to sustain itself and was considered quite successful as evaluated by trauma physician/plastic hand surgeon, E. Phillips Polack, MD, in a series of phone calls and email interactions in the fall of 2010.

67. This perspective is based upon years of engaged anecdotal conversations with physicians at workshops, in the hospital, and within personal interviews (chapter 4).

68. Stack's statement also outlined how the Meaningful Use program under the Centers for Medicare and Medicaid Services (CMS) could improve upon the demands by replacing their "all-or-nothing approach" with a 75% pass rate for achieving Meaningful Use. He also advocated physicians who meet at least 50% of the Meaningful Use requirements to be able to avoid financial penalties. For a full statement by Stack, go to http://www.ama-assn.org/ama/pub/news/news/2014/2014-05-21-proposed-rule-meaningful-use.page.

69. ICD-9 has been the standard coding system for hospital and practice billing since 1979. Originally, the classification system was intended to be used for

epidemiological and not billing purposes (American College of Emergency Physicians, 2014); but it soon became the standard for billing and reimbursement in hospitals, physician practices, and clinics alike. Originally, ICD-10 was to be implemented in 2014 but due to much concern over the already-existing systemic changes brought about by EHRs, a delay was put into effect until October 1, 2015. The ICD-10 system was markedly more complex. When combined with the existing EHR computing systems, it was to provide the means for gathering data on disease, usage, procedures, hospitalizations, treatments, and the like. Once EHR systems became interoperable, the wealth of Big Data for research and tracking purposes would be great. Of course, some physicians felt that this might lead to legal and privacy-based issues placing their practices at risk, while the argument was that the "greater good" of such vast data banks would open the door to previously unattainable data for research in disease prevention and the like.

70. When the Accreditation for Continuing Graduate Medical Education (ACGME) included communication as one of the core competencies under "safety" for medical professionals, the tide changed as the humanities were included within the study of medicine both during and after medical school. Nevertheless, there still remained some unspoken prejudice among those who studied hard science versus more behavioral sciences like psychology or even psychiatry. I state this due to two personal experiences: First was a presentation I did in Edinburgh, Scotland, at the Royal College of Psychiatry's International Conference in 2010. During our talks, a demonstration was going on outside of the hotel where those who were against the profession of psychiatry were picketing against practices that were not deemed "true science." I also have personally witnessed responses to my own daughter who received her psychiatry degree. Several people including physicians commented to me that she technically isn't a "real" doctor. Yet she went through the same basic training as other physicians. Divisions of course also exist within the professions between specialists who demand more respect than other subspecialties not only in reimbursement rates from insurance companies but also from fellow professionals. The internal dynamics of the medicological system are affected by the perceptions and responses from within as well as from outside of this space.

71. Even EHR vendors did not develop computer programs that met all of the governmental standards. Most had to invent the programs as quickly as the regulations were being passed. Many hospital systems purchased early EHRs and then had to repurchase more effective ones later. The UPMC Health System was one example of this as discussed in chapter 5. Another example was the idea of interoperability, which was not yet a reality, but which was proposed forthrightly well before EHRs were even ready for distribution. The "horse came before the cart" in this case. Laws and regulations were established even before the technological means for following these laws were met. An example of this took place in my husband's office wherein our EHR vendor, Allscripts, sold us a product for a secured portal and then in less than a year attempted to sell us a totally new program with enhanced features. The reason for this was said to be financial; but the result was my having to purchase not one but two secured portals in an effort to meet the requirements already established by the set deadlines. This shows how these changes were being imposed by outside

forces (government laws) rather than by the system players within the medicological environment. Change was more rapid in this case, but it was not as well accepted and not as effective as it could have been with a more gradual process of implementation coming from within rather than outside of the system.

72. Political arguments from Conservative groups such as the “Tea Party” had attested that the Affordable Care Act (typically referred to by them as “Obamacare”) was a direct violation of presidential power in that it forced citizens to comply with healthcare reform and would inevitably result in a full-blown socialistic society. This was yet another example of how politics had affected the perceptions and decisions. All views, accurate or not, had the potential to affect the stability if they were expressed by powerful enough people, reached a wide-enough audience, and were heard by significant players within the healthcare system.

73. The following links are helpful: http://bits.blogs.nytimes.com/2014/07/28/digital-patient-records-the-sober-lessons-so-far/?_php=true&_type=blogs&_r=0 and http://content.healthaffairs.org/content/33/7/1271.abstract. Ashish K. Jha and others pointed out the financial and health-related issues at play. Jha is a practicing general internist and is a professor of Health Policy at the Harvard School of Public Health.

Chapter 4

The Rural Environment

Testing the Landscape

To appreciate the magnitude of impact EHRs and online communication of healthcare information placed on the medicological environment, it is imperative to observe how it entered the landscape. That is, how was it permitted to penetrate this historically resistant environment let alone become acceptable and even viable? Ideally, to answer this fully, one should go back in time to observe how the idea threads emerged, reinvented themselves, and connected alongside all other technologies simultaneously networking across the globe. As fascinating a landscape analysis this would be, it certainly is not within the scope of this analysis. Broad adaptation of technology has transitioned global environments as a whole; and, certainly, all sub-environments such as this one are affected. This demonstrates the openness of the system. To examine a subsystem without acknowledging the effect of the larger system would be narrow sighted. However, this subsystem intricately intertwines medicine with philosophy, technology, law, psychology, and the like, constantly engaging with the larger system while creating its own evolving entity: the medicological environment.

To study this entire environment is impossible. Likewise, to study the first threads affecting the emergence of EHRs and online medical communication into this space is impossible as the threads reach far back into the days of Ray Tomlinson's very first email and perhaps beyond. This historic perspective appears attractive but not practical. Similarly, through time the collective experience of those using the mediums is tainted by the vulnerability of memory and the inevitable intermingling of past associations with present learning.

Ideally, the best approach is to capture the very moment in which the threads of influence began to enter the medicological environment as a new experience *for the users*—not necessarily for all of society in general. Primary sources, people who are in the process of living the experience, are ideal. This chapter examines this "moment" mainly from the vantage point of physicians. Even prior to patient involvement with EHRs and online medical communication popularity came the physicians' decision to accept this form of recording and storing of patient records. They had to learn to navigate this system, they had to pay the costs, and they had to commit to this challenge in a leap of faith—perhaps largely with their eyes closed.

By early 2009 as the HITECH Act transitioned into law, however, urban areas had already tested the challenges and effects of electronic communication. While rural areas awaited improved broadband access and techno-savvy users (physicians and patients alike), the learning curve had already begun in urban areas. More accessible to the Internet, more research oriented (particularly in academic institutions), and perhaps more financially stable, large urban facilities faced the demands of the 2009 Act with seemingly less fear and trepidation because they in part had already begun testing the technological waters of EHRs. The movement toward EHRs for many was already in process with the actual beginning point, less easy to define.

For rural areas, this was not the case. Limitations of broadband access in underpopulated regions, patient resources for using technology in the home, and lack of incentive funding for small solo practices reduced the demand and interest in making a change for change sake any time before imposed mandates. Rural physicians practiced medicine much like their urban counterparts, but the social influences affecting the two groups were different enough to warrant separate, focused study of each, particularly considering the overall climate of acceptance (or rejection) of EHRs and online medical communication.

In rural America, the impetus toward change evoked caution on many fronts. As an extended example, the medical professionals associated with the Conemaugh Health System of Johnstown, Pennsylvania, like other rural areas, questioned the practical business concerns such as implementation costs and reimbursement issues as they felt forced to comply with government mandates before a threat of what some considered "Darwinian extinction" (Boulos, Maramba, & Wheeler, 2006; White, J., 2009). The greatest research focus up until this time, however, involved a wide variety of patient-centered concerns including physician media literacy (Safran, 2001); patient literacy (Kirpalani, Bengtzen, Henderson, Robertson, & Jacobson, 2006; Pelletier, Sutton, & Walker, 2007; Shaw, Ibrahim, Reid, Ussher, & Rowlands, 2009); marginalized subgroups of populations including the elderly (Campbell & Wabby, 2003; Macias & McMillan, 2008; Mo, Malik, & Coulson, 2009); patient participation and ownership (Rashbass, 2001; Tsai & Starren, 2001); time usage and efficiency (Safran, Sands, & Rind, 1999); dysfunctional communication patterns and quality of care (Crosson, Stroebel, Scott, Stello, & Crabtree, 2005; Marglit, Roter, Dunevant, Larson, & Reis, 2006; Frankel et al., 2005; Rhodes, Langdon, Rowley, Wright, & Small, 2006; Rouf, Whittle, Lu, & Schwartz, 2007); "bloated and obfuscated" notes generated and transmitted by EHRs (Hirschtick, 2006); patient access to personal medical information prior to physician interpretation and comment (Slack, 2004); interpretation and accessibility of online educational materials (Robert Wood Johnson Foundation, 2008; Tu & Cohen, Striking Jump in Consumers Seeking Health Care Information, 2008); and legal, safety, security, and confidentiality issues (Austin, 2006; Bates & Gawande, 2003; Cantor, 2001; Hodge, Gostin, & Jacobson, 1999; Melton, 1997). This list, by no means exhaustive, reflects the multileveled challenges faced by the healthcare profession overall in maintaining quality, patient-centered care at the period in which this research took place.

With so many reservations and concerns surrounding the effective use of EHRs and related computerized technology, government mandates had unsuccessfully predicted full implementation by the year 2014. Early on, this notion was questioned as Jha et al. (2009) found that only 1.5% of U.S. acute care general medical and surgical members of the American Hospital Association had fully implemented EHRs, while 7.6% had even minimal usage in at least one clinical unit. Likewise, in another national survey of physicians (DesRoches et al., 2008), only 17% of American physicians were using EHRs even to a limited extent. Similarly, the Markle Foundation showed that only 6.1 million or about 2.7% of all U.S. adults had personal health records (Americans Overwhelmingly Believe Electronic Personal Health Records Could Improve Their Health, 2008).[1]

Such limited numbers of participants further beg the question as to how full implementation by all healthcare facilities and full interaction *between* systems[2] could have been effectively achieved by 2014 if the number of users at the time of this study were so few. Was the answer to begin with large hospital systems and then to require individual office practices to adopt compatible systems? Or was the answer to begin at all levels simultaneously as government policy makers ended up mandating?

Whichever the approach or combination of approaches, an even-more complicated problem existed in rural areas. Unlike urban populations, which were most readily represented by the above-mentioned research, the rural physician was often a solo practitioner identified by a high prevalence of physician/patient media illiteracy, poor Internet access (often at best a dial-up system), and lower socioeconomic patient populations.

A PERSONAL PERSPECTIVE: JOHNSTOWN, PENNSYLVANIA

For many rural physicians, particularly in Johnstown, Pennsylvania, the thought of EHRs was an unpleasant reminder of technological interventions and government influences of the past. Most rural offices had already converted (though often reluctantly) to some form of computerized billing for reimbursement purposes since insurance companies often required direct, online access for billing and payments. Notably, the mechanical transition toward paperless billing was more an issue for the secretarial staff than for the practicing physicians. For the most part, physicians themselves were not yet forced to use computers as part of their direct patient care. Likewise, talk of EHRs brought back harsh memories of earlier government "impositions" like the Health Maintenance Organization (HMO) Act of 1973 whose influence reached the practices (and pockets) of rural physicians particularly in the 1990s. As various addendums to the policy streamlined the HMO's effect on altering the process of ordering tests, using "recommended" medications, and generally practicing daily medicine, the imposition of such outside forces on the relatively closed practice of medicine was felt and resisted.[3]

As my husband, Eric, a solo family practitioner, once said to me, "I hope EHRs go away and stay away until long after I retire." His seemingly cynical words reflected the attitude of many of his colleagues in outlying regions where physicians already had "a bad taste in their mouths" from insurance companies and the government telling physicians how to practice. I intuitively realized why my husband responded so strongly to EHRs, as I personally managed his practice during those difficult days of early computerization and new government mandates. The influence of HMOs became a reality to us soon after we opened his solo practice in 1988.

The HMO Memory

At this time, it is vital to take pause in discussing this earlier influence of HMOs as their introduction into this environment acted as a key force of influence that set up the subsequent resistance of physicians against the upcoming mandated EHR adoption. People perceived the present in light of past lived experience. My husband's lived experience with HMOs was not unlike most of the other middle-aged, rural Johnstown practicing physicians who faced the decision to adopt or reject EHRs in their practices. The process of EHR implementation to some extent mimicked the earlier financial and professional situation of HMO adoption. Those who created the most resistance to EHRs, or who had simply decided to practice without change until early retirement, were the same ones who had the most to lose financially as independent practicing physicians. Again, a parallel existed between the implementation of these two influential laws. Memories lingered and likely influenced subsequent responses.

Early on, rural Johnstown, Pennsylvania physicians did not know whether to join the HMO or join others who were attempting to form their own private group to combat the force of change. The group was called the Johnstown Physicians Organization (JPO). Its goal was to unify local physicians to band against the national infiltration of HMOs in the Johnstown region. Physicians were asked to pay membership into the JPO and in turn hoped to gain voice and solidarity against the advancement of HMOs in the local area.

Rather than participate in the JPO cause, however, my husband decided to become an early HMO adopter. Insurance companies paid higher incentive premiums to early adopters. The decision was made based upon his own observation of how other regions across the country failed to resist the advancement of this newly designed governmental law. This decision proved to be a lucrative one since incentive payments were initially high. It taught us something as well: As a solo practice in a rural area, it was difficult to fight against large national programs—banding together in a single community was not enough to fight against a national system of change. The force to join was simply too great to resist in rural America. The JPO folded soon afterward, and physician members joined the HMO after all without enjoying the financial benefits of early adoption.

Nevertheless, my husband experienced great discontent over the long-term ramifications of the HMO Act of 1973, which took until the early 1990s to affect us in full force in the rural regions—just about the time when we were attempting to enter a solo practice independent of any single hospital affiliation. At this time, the standard "fee-for service" paradigm was being challenged. Patients for the most part no longer paid for each visit, test, or service they received. Instead, this process was replaced with a standard, prepaid, monthly/yearly fee to insurance companies that would include most services, no matter how much a patient used them. The physician was paid for each of his registered patients on the insurance list whether or not he/she saw those patients each year.[4] What would and would not be reimbursed also was predetermined by an insurance review board, thus causing physicians to feel that the HMO, not the physician, was determining how to practice medicine. This change led to multiple other challenges for healthcare including the introduction of "referrals," which were written orders from PCPs for permission to see a certain specialist for care in order that the plan would pay for the service.[5] Many physicians in larger practices were forced to hire separate personnel for doing that job alone. Over time, the use of referrals diminished with fewer being expected as part of subsequent healthcare insurance requirements. Nevertheless, costs were not reduced by adding this extra layer of paperwork; and referrals, if still necessary, were now replaced for the most part by electronic submissions through EHRs.

As this example shows, rural areas did not feel the effects of HMO laws until many addendums were made and until hospitals and solo practitioners were faced with offers by major insurance companies to "participate" and join their select group of "qualified" practitioners. Rural areas experienced this delay while watching others in urban areas join the HMOs and fearing what it would mean to them as smaller, less powerful entities. This frightened many who feared that a sort of "takeover" was in effect with insurance companies mandating how physicians should practice medicine.[6] By the time that EHRs came along with the HITECH Act promising "change," the older rural physicians' memories were fresh, still disenchanted with the results of the HMO process. Few wanted to face yet another such challenge, especially one that included a full computerized revamping of the entire healthcare system and one that promised "preventative care" (quite reminiscent of the HMO promise of 1973). It is no wonder that this environment was plagued by memories of government interference with what the physicians perceived as their professional expertise and basic practice of medicine.

This impending fear was particularly at the heart of older physicians. To join too early meant to give up a portion of anonymity; yet, not to join soon enough meant to lose all of the incentives offered by the government and to face even worse penalties for not adopting EHRs as time went on. Yet at the heart of all of this was the fundamental desire to be an effective, knowledgeable, "good" physician, despite what the political or socioeconomic climate within the medicological environment seemed to want. Physicians desired to do what was best for their patients, but they thought that what they already had been trained to do *was* already what was best for them. It was not a wonder that physicians experienced doubt, fear, caution, and even resistance.

EHR Choice and the Insurance Dilemma

To add to this, along with the struggle to find the best EHR product, emerging regional hospital "wars" existed in Johnstown. The term "wars" appears to be harsh, but it was a common term used in the region to discuss not only the turmoil and competition in the rural hospitals but also that which was going on in the urban areas as well. Urban affiliations affected rural ones. For instance, hospitals were being "bought out" by each other as each affiliated with a different preferred insurance program. In the Pittsburgh metropolitan region, UPMC Health Systems, for instance, used their own UPMC Health Insurance. Allegheny General Hospital and West Penn Hospital mainly used Highmark Blue Cross and Blue Shield insurances.[7] The hospital associations affected which insurance was accepted, and that affected the urban hospital affiliations that bled into the rural areas. For instance, two local hospitals just outside the Johnstown region became affiliated with UPMC Health Insurance: UPMC Bedford Memorial and UPMC Altoona. On September 2, 2014, Conemaugh Health System's Board of Directors and Duke LifePoint Healthcare announced that Duke LifePoint acquired Conemaugh Health System's three hospitals, its outpatient centers, and the Conemaugh Physician Group practices. When such acquisitions occurred, the question of what health insurance policies would or would not be accepted concerned patients and physicians alike.

Directly or indirectly, affiliations also influenced how these hospitals interacted with each other and their patients, what EHR system was used, how interoperable EHR systems were with each other, and what the preferred affiliations were of smaller businesses and/or solo practices in the region. Systemically, it was all interconnected. One cannot examine the existing state of affairs of EHRs in the Johnstown region, for instance, without taking note of such alliances with hospitals and insurance companies. The medicological environment was not only about whether to *use* EHRs but was even more about which was the best product for interoperability, how this product might serve the needs of the facility, what costs were involved, and who could access the information.

Many felt the larger healthcare systems were "fighting" in a "war" to seemingly "shut out" the small solo practices. EHR systems strongly fell into this mix of concerns since which system was used could minimize interoperability with smaller, independent practices. For physicians to have direct access to the hospitals to which they preferred to admit, they had to be able to access the EHR system even if it was not compatible with the one they used in their private office. If, however, the physicians worked for the hospitals, many times the EHR system that the hospital used was already in the outlying hospital facility in which they worked. This was a serious factor in how effectively and smoothly EHRs were adopted in rural regions. Changing an EHR system was no easy matter. It was expensive, time consuming, and stress-inducing. To transition to a different EHR system might be possible for someone who worked for a large hospital but certainly not as easy for someone who did not. Herein lay the complicated problem of EHR adoption.

As yet, my husband's practice had not joined any healthcare system. Early on he purchased his own EHR. This was not without challenge. The climate remained in flux. When deciding on an EHR system, we chose Allscripts because at the time of our implementation, the major service provider in the area, Conemaugh Health Systems, was using that vendor. Allscripts was available for large and small practices, so it seemed to be the most logical choice at the time. However, once Conemaugh Health Systems was bought out by Duke LifePoint, Epic became their EHR of choice. Smaller groups and solo practices like ours could not use the Epic system because it was sold to only very large facilities. The only way our system and Conemaugh's could be fully interoperable would be for us to sell our practice to Conemaugh, become employed by them, and then possibly have eventual rights to the Epic system. Switching back and forth was not only expensive but was also impractical.

The EHR medium choice, therefore, directly affected the decision-making behavior of physicians within the environment. These were serious financial and feasibility concerns. Certainly, all this reinforces the point that this environment continued to be fraught with challenges, changes, and complex interlocking factors of politics, medicine, insurance companies, and, yes, even patients.

Furthermore, if, for instance, a physician elected to join Conemaugh Health System as one of its employed practitioners, the physician would likely get the newest Epic EHR but would also have to abide by health insurance stipulations approved by that hospital system. That is, insurance preferences together with EHR systems were very much a part of this environment and added to the complexity of the related choices considered in making system-wide decisions. At this time, because of the complications associated with these decisions, the environment from the physician perspective was a challenging, perplexing, and frustrating one. Larger systems almost held smaller systems hostage with EHR vendor choices and related health insurance preferences at stake. Now, for many, EHRs stood as the central issue of control.[8] This shows the overall level of influence that EHRs held. Small solo practices could not gain access to the product without joining larger, hospital-associated practices.

The Rationale for Study

With all this in mind, the path toward greater understanding lies first in looking at the people who are living this experience: the physicians. My husband's and my personal story and insight is relevant and a singular part of the perceived experience of primary users, but it certainly does not suffice in representing the entire environment.[9] There is a need to explore this environment systematically through the eyes of other physicians who had lived experience through primary contact with the EHR transition within this particular rural area.

The next sections address physician perceptions in two ways: first through oral history interviews and second through anonymous surveys. In the first case, several rural physicians from the Johnstown area were studied using the in-depth, oral history interviewing methodology. Explored are their decisions to use EHRs, their feelings about the process, their existing and/or potential use of online communication with patients, and their overall conceptualization of the environment in the moment of time when adoption of EHRs was being required for the practice of medicine. In the second method, surveys distributed to rural physicians (including those who may have taken the personal interview) were used to gain an anonymous, broader perspective of this climate. Neither of the two methods claim to suffice in capturing the entire picture. Together, however, they provide a broader view of this moment in the history of American medicine when physicians must either make a dramatic change in how they practice or face the consequences of penalties or retirement.

In short, the remainder of this chapter explores the environment within which physicians and patients were introduced to online communication within rural areas. The functional means for this introduction was the implementation of EHRs, the medium through which physicians and patients were able (or would be able) to communicate securely and actively. As discussed in previous chapters, active use of online communication within the healthcare arena depended on the means for providing secured messaging. Unless physicians accepted the EHR medium, it was unlikely that online communication would become the norm due to the need for having a broadly available secured system for transmitting these messages. Therefore, this research examines online communication at a time when wide acceptance did not yet exist. The focus is on the views of the participants who lived within this medicological environment at the time when EHRs were becoming mandated and online medical communication was becoming examined as a potential part of that mandate.

Subsequent chapters will expand upon this approach to include the urban climate of this medicological environment. Of course, throughout the entirety of this research it is not possible to separate perfectly the rural and the urban participant. The physicians who were interviewed and surveyed may themselves have been exposed to urban facilities through prior jobs or training experience. Likewise, those who utilized the urban electronic messaging services even prior to the time of the HITECH Act implementation may have been rural patients who traveled to urban areas for care. Simply put, there is no way of knowing for sure to what extent some of this overlap may have existed between these two populations. The key, however, is that urban facilities at the time of these studies were much more likely to have had experience with online communication within secured portals than were rural facilities, which at the time struggled in part even with broadband access for the majority of their more remote patients. At best this exploration is a study of the environmental climate within which the electronic medical messages entered and began to become accepted as a normal part of physician/patient relationships.

ORAL HISTORY INTERVIEW OF PHYSICIANS

At noon EST on January 20, 2009, President Barack Obama took office. Less than one month later, on February 17, the Stimulus Package including the HITECH Act was signed into law, forever altering the face of the U.S. economy. These changes were supported by government lawmakers, approved, and set into motion. However, to the physician, the stage was set for a complete revisiting of how physicians and patients should record, store, and share information about health. This was no small change; and physicians likely were ill prepared for what was implied by this act. As earlier stated, it was presented along with a wealth of other economic reforms. Closely and clearly intertwined within this Stimulus Package was the notion of "healthcare for all"—as well as online record-keeping and electronic communication. Physicians would have to alter not only how they *viewed* the physician/patient dyad but how they participated within that dyad with the use of technology.

This series of interviews attempts to exemplify how some physicians responded to this change. Inherent in each interview are the questions about how EHRs are perceived and how the notion of online communication with patients would affect their own profession and, in turn, the lives of their patients.

Initially I intended to interview physicians in the surrounding Johnstown region to get a feel for their thoughts, feelings, and observations about online communication—such as email—between physicians and patients. I soon realized that the line of questions had to begin with the topic of EHRs, since that was the participants' main initial concern. What I did not anticipate was how few physicians early on had any real interest or experience with online communication at that time. As discussed in previous chapters, EHRs drove the medium of online communication forward. It was the need to make charts electronic that was the concern of physicians initially, not the use of emails with their patients. Emails were a staple form of communication in society overall, but not within the field of medicine.

Rural Physician Case Study: A Practice in Transition[10]

Subject Selection Criteria

In selecting a physician practice to observe, it seemed apparent that the best place to start would be with one that had already made the transition from paper to electronic charts. It was assumed that the group would likely be proactive, open to new technology, and perhaps more likely to communicate online with patients than a practice that had not chosen this action prior to it being a requirement.[11] After all, with the HITECH Act only coming out in

February and these interviews commencing at about the same time, the likelihood of a lot of practices already making the conversion would be slim, at least in the rural environments that may not yet have broadband. It was also hoped that if the group considered itself satisfied with the transition, it might serve as an example to future groups and individuals who might learn from their experience and follow suit. The key was finding such a practice.

With relatively easy access to rural physicians within the Johnstown region of Pennsylvania, I inquired with the medical staff at Conemaugh Memorial Hospital and Windber Hospital in an effort to identify which, if any, physicians were already using EHRs, which were considering early adoption, and which were expressing resistance to the transition. Likewise, I decided to look only at independent physicians instead of hospital-based or hospital-managed ones. The desire was to examine how physicians themselves would select their EHR vendor (the company which produces the programs for EHR functionality).

At the time, some physician groups who worked for the local hospital system were already being introduced to potential EHR vendors. Systems were being tested and implemented. The Conemaugh Memorial Medical Center of Conemaugh Health System had examined and agreed upon the vendor, Allscripts, for their practice groups and for the hospital itself (as hospitals are also part of this mandate). This of course was when they were still an independent, nonprofit entity. Already in urban areas, large hospital systems such as UPMC were actively using other such EHR systems throughout their practices, within their university-based teaching facilities, and through their hospital departments. Typically, physician groups and administrators of larger facilities such as these reviewed various EHR vendors to purchase large quantities of program licenses and equipment at lower costs with greater ability of interoperability between the practices throughout the hospital system.

Because of these considerations, for this set of observations, I determined that only private practice, independent physicians would be studied since (1) they existed as a relatively unique entity in rural areas and (2) they more clearly represented the decision-making and adoption process on a smaller, more easily observable scale.

Finally, I chose to study PCPs because this group had the greatest population of long-term patients who had a higher likelihood of developing long-term relationships with their physicians. With the goal of studying online dyadic physician/patient interactions, a primary care practice was thought to be ideal since it was the most likely group to nurture such a relationship. In this study, “Primary care” included general practice, family medicine, general pediatrics, general internal medicine, and general obstetrics and gynecology (OB/GYN).[12] These practices typically saw patients over longer periods of time, with other members of the extended family (as in “family” medicine), and for a broad spectrum of health needs. They tended to be the initial contact, the ones who "referred" patients to specialists if need be. For insurance purposes, this group fell under the category of "PCP."

Specialists were, of course, also required to adopt EHRs, but their clientele tended to be characterized by fewer long-term relationships (with chronic conditions being an exception). Their EHR systems did not tend to be as complex in that they mainly involved one specialty instead of multiple ones. This difference was significant in studying the effect of EHRs on the PCP versus the specialist since the complexity of the systems were widely different. For instance, a podiatrist did not typically have as many different "checkboxes" or "menus" to cover within the EHR program for a "review of systems" (the part of the medical interview that overviews all possible related problems that could involve the "chief complaint" or reason for the visit).[13] PCP EHR systems tended to be much more complex in that they covered a wide range of interrelated illnesses and treatments to facilitate the necessary narrowing, exploratory process of the PCPs' diagnosis. As a result, adoption of EHRs for PCPs was often much more challenging than for specialty practices.

In short, several criteria were used to select the first group of physicians to be observed. These physicians ideally needed to be (1) designated as primary care practitioners, (2) working within a rural community, (3) independent from hospital practice management,[14] and (4) transitioning from paper to electronic charts for the first time (i.e., without prior, firsthand experience with another system). By following these criteria, a point in time—*the time of transition itself*—could be captured for observation. In the case of urban physicians from larger hospital-based practices, the decision to implement online communication would likely already have been made for them and the rationale and thought process that independent rural physicians were forced to go through would not be present. Studying this group right in the midst of a national transition provided insight into what others may have experienced throughout the transition period from paper to electronic charts (along with all the other medium "benefits" such as online communication). Exploring a group in transition provided a means of investigating the thoughts, considerations, decision-making processes, emotions, fears, anticipations, and overall experiences of those who were making this transition.

Methodology: Oral History Study

In an attempt to hear the real voices of those medical professionals who had experienced firsthand the trials and challenges of adapting new technology to the needs of their patients, a series of oral history interviews were conducted with a father/son internal medicine team, their family practice female partner, and their female office manager. Although this research did not capture the global perspective of a national probability survey, it did capture the heart of individual group members who chose to leave their former office practice, which did not use computers, and open their own, which was totally "paperless" and fully computerized. This study of rural, Pennsylvania medicine, did not attempt to identify all issues faced by offices in transition. It did not presuppose any hypotheses or limited variables of social science research. Instead, it allowed the physicians' and manager's own voices to be heard on an intimate level with a focus on the most basic question of "How do your patients perceive the changeover to the new office's fully electronic medical record system?"[15] This "practice in transition" candidly discussed its trial and error use of emails with patients, Internet educational materials, computers in the patient rooms, and basic EHRs.

As can be seen in these interviews, despite the positive outlook this group of physicians and their office manager had toward EHRs, the struggle to facilitate patient-centered care remained. In making this argument, first the education, training, and past patient experiences of each of the interviewees are described to explain why they chose to make this change before government mandates were in place. Second, the interviewees' perceptions of patient responses to this new media experience considering participation, education, and overall satisfaction is examined. Finally, this segment focuses on anticipated future communication problems and media concerns faced by these health professionals in an ever-changing technological environment.

A Motive for Change[16]

After thirty-three years of practicing medicine with three other PCPs, Wayne White, MD, and his office manager and wife, Sarah,[17] likely would have remained with their partners through retirement had not patient and management concerns become an issue. As Sarah recalled, "There were sheets of paper here sheets of paper there. . . . At the end of the day you would find 60 to 100 charts pulled out . . . and 50 to 100 sheets with lab results all needed pulled and charted. It took hours. . . nothing but filing. . . the records room was probably 1000 square feet of [*wasted*] space" (White, 2009).[18] Wayne explained that this lack of efficiency and accuracy had a direct impact on patient care, safety, and satisfaction. When he would ask the secretaries to find a chart on a patient, he would have to wait "a half hour at the old office if they even find it at all" because things "laid around for six weeks and never got filed."[19] Sarah added, "It was at least an hour delay before that information got back to the patient if at all." Precious time was lost for the physician and staff, not to mention the potential safety hazard for the patient in need. Of lesser yet practical importance, both Wayne and Sarah emphasized that the cost in employee time and wasted office space further led to their increasing dissatisfaction with their partnership.

During their last two years of working at their previous facility, their son James White, MD, joined the practice, fresh out of residency. Also, an internist, James expressed his fear of "taking a major step back" when he joined a practice that was "completely unwilling to adapt to modern medicine" (White, J., 2009).[20] He was careful to note that his previous partners were excellent physicians in their "50's and 60's" but argued that "if you don't adapt you become extinct." He felt this was so no matter how dedicated one was in the medical profession. His frustration and embarrassment mounted when medical students and physician assistants would see patients in the office and ask, "Well Dr. James, where are all the computers?" From his point of view as a young physician coming from a more up-to-date residency program, being advanced in technology also meant being advanced in one's professional expertise, not only to peers but patients as well.

Therefore, despite efforts to convince their previous partners to transition over to an EHR system, the family group took their nearly 7,000 charts with them to be scanned and shredded. They hired an additional partner, Christine Harrison, DO,[21] a former Hospitalist[22] in a nearby city who, at the age of 33, was also familiar with more advanced medical record-keeping. Together they embarked on the challenge of converting their entire office practice over to an electronic system that promised to improve patient satisfaction, safety, and efficiency.

A Patient Response to the New Media

From day one, White Medical Group opened their doors to their loyal patient population and welcomed them into a new world of technology. At first, most patients did not notice any difference. Christine noted that some did not "have any idea I even use the computer" (Harrison, 2009)[23] and Sarah agreed that some "are not quite savvy enough to understand." However, for the most part, each "narrator" (an oral history term used to refer to the person interviewed) insisted that the patients were very much "impressed" by how well the office ran and how pleased the patients were that their physicians incorporated technology into the medical examination.

To begin with, the office overall appeared to run more efficiently. Sarah stated, "We had a lot of patients who were very impressed because when they made a call to the office, you could pull that chart up immediately and know and see what needed to be done." The patients could "get that information right away" and were "treated on the spot" without having to be called back. As Wayne stated, "They're off the phone and happy as a lark." This improved communication was thought both to reduce safety concerns due to loss or misplacement of records and to enhance patient satisfaction by responding more immediately to their needs.

Within the medical examination rooms, the main change was the use of a computer laptop for reviewing chart information, finding information on the Internet, placing prescription orders, and using a word recognition program which allows the physicians to dictate their medical summaries right in front of the patient.[24] At first, each of the three physicians tried taking the computer into the room with Wayne being the most loyal to its multiple applications. Soon, however, each noted that there were complaints by patients about the resulting decrease in eye contact. Christine and Wayne said that patients would come right out and say, “Are you listening to what I am saying?” or “Hey Doc you have to look at me.” James agreed adding, “I still think the patient deserves to be looked in the eye when you tell them the bad news. They deserve to be looked in the eye when you are giving them your opinion. They do not deserve to look at the back of a keyboard. That’s the way I feel about it and I think that is simply human decency.” Due to these concerns expressed by each of the physicians, they stopped taking the computer into examination rooms.[25] They rather reviewed the charts at their desks prior to walking into the patients’ room and carried only brief notes with them when they spoke with their patients. Wayne, however, said that he was again reconsidering using his laptop in the room because it was a “project in evolution” that in the long run might best facilitate patient satisfaction and education when used appropriately.

Wayne insisted that his patients appreciated the computer’s many benefits. Previously, he dictated progress notes using word recognition while the patients watched as the information appeared on the screen. He said that this allowed the patients to correct misinformation instantly and to make clarifications if needed. He also noted that they “loved to look over my shoulder” reviewing their X-rays and lab results with him and searching the web for medical information together with him in the office. He felt that the computer acted as an excellent teaching tool when used properly in that it demonstrated how much work physicians often do outside the patient rooms, how patients might acquire reliable, accurate information on the Internet, and how current and knowledgeable their physician is in his profession.[26] Besides these reasons, Wayne said that patients egged him on to keep using the computer in the room by asking, “Hey doc, where’s your computer?” He stated at the time that he planned to resume using it as soon as he had “broken that habit” of looking too much at the computer screen and not enough into the eyes of the patients.[27]

Although none of the physicians felt comfortable communicating with their patients on email on a regular basis due to liability and safety issues (as they did not have secured portals), they did spend a considerable amount of time discussing the importance of educating their patients on Internet information and use. Christine stated that she regularly directed Internet users to specific websites and welcomed patients to bring in outside information.

Wayne noted that although "Dr. Donohue" (now Dr. Roach) from the local newspaper was the most frequent resource for his elderly patients, many did bring in extensive literature from WebMD or Google which they or their family members found.

Interestingly, both James and Christine emphasized the importance of physicians acting as information gatekeepers by monitoring the types of websites used and the ways patients interpreted and applied information they found. James stated, "I encourage an informed, intelligent patient. The problem is some people don't use that information correctly. I've actually seen people fire their physicians, 'Well I read on WebMD this, that, and the other thing. I'm not going to that quack anymore.'" He welcomed the challenge to his own credibility and insisted it was important to help the patients discern between accurate and misrepresented information: "It's when the patient is sitting around second guessing their doctor and is using his or her computer. . . . The thing is, you better be ready and you better be able to challenge them when a patient comes in and shows you a piece of literature [from the Internet]. You can't sit there and say, 'Oh that's a bunch of crap' anymore." He argued that although some physicians felt threatened by this, they should rather be motivated to stay on top of the resources available online. He felt that electronic texts were often much more up-to-date than text books, which, he said, to a large extent were "outdated" by the time they are published.[28] He added, "People realize we are all human, and we are not able to store all these things in our minds." He adamantly stated that there must be continuously cooperative, educational, and open communication with the patient no matter to what extent technology was used.

Finally, each of the physicians insisted that the older patients were surprisingly likely to use the Internet very actively during their retirement years to keep in touch with family members and research their own medical concerns.[29] Interestingly enough, it was the middle-aged patients who were identified as having the most problems with the paperless system brought on by EHRs. Christine remarked, "It's not the 80- or 85-year-olds who were complaining about there being no chart in the room but rather the 45- and 50-year-olds. They say, 'You should have that in my chart. Why don't you have it here?'" Sarah also described a case with two elderly patients and their 50-year-old daughter:

> [James] uses a clip board with him with copies of his own progress reports. The guys have the ability to bring the EMR[30] into the room but he chooses not to. His way of seeing patients is he likes to pull that patient's chart up in the privacy of his own office. He has already reviewed these charts on these people but he doesn't have the chart with him. [James] walked into the office and she [the daughter] immediately hit him as to why he did not have a chart with him.

> He told her, “I have completely reviewed your parents’ charts in my office. I have a completely electronic system. I have looked at all of the information that we are talking about.” . . . He immediately went to his office and printed her out all of her lab reports that he got on her parents from the hospital and gave it to her. He told her, “I have the ability to bring the computer in here just as if I were holding a chart, but I prefer not to do that.” That put her at ease, and he continued with the visit.

These examples support the notion that middle-aged patients were often less accepting of EHRs than the elderly patients either because the latter were more trusting or because they did not notice the absence of the charts.[31] Either way, these physicians agreed that it was vital to their successful and effective treatment of all patients that patients were taught not only how the physician used EHRs outside of the room but also how the patients could use their own computers to seek accurate medical information.

A Look to a Future of Continued Challenges

At the time of these interviews, the White Medical Group looked ahead to the next step in developing an even-more integrated EHR system and continuing to introduce improved technology to their patients. All members appeared to be very enthusiastic about what would lie ahead. Although their online medical charts at the time were mostly scanned paper charts, they expressed the desire from that point onward to convert from the scanned records into a more interactive EHR program which would enable them to take into the room convertible laptop tablets with pregenerated lists and notes to help with payment, record-keeping, diagnosis, and treatment options. The physicians hoped they soon could cover checklists rapidly while maintaining eye contact with the patient. They hoped to generate notes, orders, and prescriptions directly from the patient rooms and to order laboratory tests and therapy, send prescriptions in to the pharmacy, write in the patient chart, and send orders to the nurse all *during* the patient visit. This efficiency promised to allow for more time with the patient and improved participatory care—a similarly shared, ongoing goal of both the rural and the urban physicians.[32] The White Medical Group appeared to be looking toward a positive and improved used of EHR capabilities like many practicing physicians did at that time.

Due to future improvements in the EHR system, each of the physicians agreed that it would be necessary to take the computer into the patient room since eye contact issues would be less of an issue with the laptop tablet design. Each asserted that the overall paperless system was healthy for the practice and was vastly better than their previous practice which had no computers. They viewed the process as a dynamic yet very positive one. Sarah simply summarized, “Since day one, no one complained!”[33]

Upon probing more deeply into the physicians' projections for the future of EHRs and technology in general, I found that certain underlying fears and concerns remained. For instance, Christine warned against patients relying too heavily on Internet information acquired from weak or difficult-to-understand websites. She said that her younger, more computer-savvy patients had been using wrongdiagnosis.com or quackwatch.com much more often, sometimes not trusting her ability to discern between legitimate and erroneous data. They had brought in obscure diagnoses, convinced that they had a certain disease before trusting in her medical knowledge and expertise. She admitted that few patients did this, but the number could increase as patients got more and more comfortable with surfing the web.

Christine along with Wayne and James believed the future success of patient technology usage would depend upon effective physician-patient communication. Christine felt it was important first to ask patients if they had Internet access, determine what websites they used, direct them toward useful sites and blogs, and instruct them on the best practices for doing their own research. She argued that sitting down to explain things carefully, though time consuming, was ideal. To a large extent, she believed this would help the more media literate population to comply with her diagnosis and treatment plans. She provided a typical example:

> If I newly diagnose a person with diabetes or high cholesterol, the shock of that . . . . "Oh my gosh I have diabetes" is great. After you say that, nothing else really sinks in. So they need to be able to look up the information on their own online and assimilate that and then come back to me and say, "I read this but I am not quite sure what this means to me." That's better instead of trying to throw all the information at them at a time they are not listening anyhow. So there are a lot of different reasons that the Internet materials are both helpful and not so helpful.

By helping to teach patients to use the media effectively, she felt the physician could improve patient compliance especially in reference to those medical problems dealt with on a preventative basis. She said that her younger patients often looked and felt healthy and, consequently, often did not want to take their medicines to prevent complications. Showing them appropriate websites and documentation could expand their knowledge and understanding of their problems and could increase the likelihood of them taking ownership of their own health issues.

Perhaps the most revealing statement about the promise for technology came from James as he cautioned over reliability on EHRs and Internet access in the patient rooms:

> The patient interview is more important than the data, it's more important than the record, it's more important because that is how you build trust and rapport

> with your patient, not by having wonderful technologies. . . . When we were medical students we were still taught to be doctors first not technicians. I mean at some point there is still an art of medicine; it's not all science and technology. I think a lot of people forget that. This is still a field where you build . . . *lifelong relationships with your patients*. (Italics added)

In the rural medical setting, the solo or small-group practice physicians knew their patients from birth through old age and developed a lifelong relationship that was marked by cooperative learning and patient-centered care. Perhaps these characteristics had set them apart from the urban specialists and multimember groups, which serviced a larger, more mobile population. Indeed, the rural physicians seemed to approach their patients in a personal, individualized manner, especially when it involved technology.

Observational Bias and the Medicological Environment

This insight into a single office practice provides a glimpse into the medicological environment from the inside out at a particular point in time when the transition into electronic records and online communication between physicians and patients were first being tested. It shows the day-to-day concerns of real people whose livelihood depended on a successful practice. In a more subtle way, it also reveals how deeply the physicians and members of the staff felt about and cared for their patients. These participants indicated that they were quite proud of the fact that they made the successful transition to a fully paper-free practice. When viewing the office in person, it seemed almost naked without the ever-present rows upon rows of charts which were then typical of most offices; but there was also a sense that this was an efficient place that was up-to-date and well on its way in caring for patients in the most effective, cutting-edge manner. This rural American practice appeared to be a busy, devoted one committed to patient care above all. In fact, little, if anything, was said throughout the entire interview process about physicians "having" to make this change. In this practice, change was a welcomed way of the future.

Perhaps one might surmise that this scenario was one which the lawmakers had in mind for all practices when the HITECH Act went into effect. However, there are a few things to consider when drawing such conclusions from this observation: First, this practice just invested a great deal of money, time, and energy into a product of their choosing. They were showing their decisions and outcomes to a fellow, rural physician's wife who was writing about their results—results that they apparently wanted to have looked upon favorably, not shamefully. Few, if any, complaints were made, almost as if the picture was "perfect" and complete. Perhaps they did not want to be a bad example, especially since they just left an "outdated" practice to move forward to do a "better job" than their previous partners. Like with any observation, there is always a possibility of bias, and "saving face" certainly could be reason enough for them to say that this was the best outcome for them and their patients. After all, if it were not, then they would have made a poor business investment, they would have been an example of how technology failed, and they would not be caring for their patients in the best way possible. Again, this may or may not be true, but it at least needs to be considered when drawing conclusions about this observation.

Second, the transition from paper to electronic charts certainly was a change for all physicians involved and a tribute to cutting-edge technology. However, upon examining this practice more closely, the "charts" for the most part were merely scanned charts that were placed into electronic folders for recording purposes. Granted, this was how most offices initially made this transition; however, to tout that the practice was truly using the full functionality of an EHR was not quite accurate. At that time, there was a lot of scanning, copy/pasting, and dictating electronically; but there was not a lot of "check box" categorizations being used that were typical of EHRs in the urban areas at the time.[34] This too might be an unfair observation since the practice had no other choice than to record old files through scanning. However, when Wayne demonstrated his electronic records, he spent considerable time showing how to use voice recognition tricks in dictating with his Dragon Medical equipment. Although the technology at the time was just becoming more and more user-friendly for physician dictation, it really was not the technology that made EHRs technologically advanced. That is, voice recognition was merely a substitute for typing information into a chart. What was most characteristic of EHRs was their wealth of checkbox entries and ability to take the data and run extensive reports on that data. In the early part of 2009, however, such reports could not be run on blocks of scanned word documents. Therefore, it is possible that their enthusiasm was more for owning and beginning to use a new technology than it was for mastering the full functionality of EHR technology.[35]

Third, it must be kept in mind that this was only one observation of one practice in one rural community of the United States. Not all communities were alike. All had different levels of accessibility to broadband, literacy levels, media literacy levels, socioeconomic backgrounds, education levels, and the like. Even the size of a rural community varies. In fact, the U.S. HHS stated that "the Census does not actually define 'rural.'"[36] That is, it is defined more by default: "'Rural' encompasses all population, housing, and territory not included within an urban area. Whatever is not urban is considered rural." The definition does not follow city or county boundaries and makes the distinction difficult to specify. For instance, in 2010 about 19% of the U.S. population was considered rural, but over 95% of the land area itself was classified as rural. Therefore, to say that this rural practice is representative of all or even most rural American practices is difficult. Nevertheless, by default, since this area is not labeled as "urban," it must be "rural." The process of adoption represented in this case study, therefore, exemplifies the characteristics of and challenges of a rural physician practice environment.

Fourth, this set of oral history interviews did not reveal anything about electronic messages as was hoped. In short, the physicians and office personnel at the time did not use email with their patients. It was not something they even seemed to want to talk about. Providing electronic information to their patients, teaching them how to use the Internet to find their own information, and showing items of interest to patients on the computer screen during the office visit did seem to be important to these physicians. Emailing patients and any online communication, however, was not discussed as being important. This is to be expected since secured portals as a medium were not really a part of the mindset of these physicians at the time. Their goal was to get the information online so that they could retrieve it faster and improve the efficiency and safety of their office. Electronic messaging, as promised by the existing mandates of Stage Two Meaningful Use, was scheduled to become part of this process. Accepting EHRs and computers in an office necessarily set the stage for expanded later use.

Finally, overall, the purpose of this oral history was to capture a moment in time and to reflect on what that moment looked like within that space. No doubt, if the White's practice was assessed in 2020, their usage would be very different. Time, experience, and technological advancements all played a role in the appearance and function of the medicological environment. The White practice simply was not representative of all rural family practice offices; and yet, despite its limitations, it still provided an informative peek into a real practice right around the time when the mandatory laws came out to begin the EHR implementation process.

General Conclusions from the White Practice Experience

All in all, the transformation of a rural office practice to a high-tech facility affected both physicians and patients on multiple levels. Although many perceived benefits were identified by this particular group of practitioners, many challenges in maintaining patient-centered care remain. At the time, most studies focused on the practical issues of patient safety, upfront costs, practice management, and patient education.[37] Media literacy remained a real concern in light of not only patient users but also physician users. Without both being on board with the changes within the medicological environment, it was questionable as to whether EHRs and eventual online communication within secured portals would develop to the extent that some hoped. As the whirlwind of change stimulated by the American Recovery and Reinvestment Act settled, the question remained as to how this change would ultimately affect the quality of the physician-patient relationship. In 2009, the concern was over the *presence* of a computer, but as EHRs became more and more a part of the environment and the Stages of Meaningful Use forced the implementation of online portals and patient/physician electronic medical communication, the new concerns became more about how physicians and patients were communicating online than about the mere presence of the computer in the office. The environment continued to change. This observation provides a single recording in history of how one practice began this process.

Advanced technology was inevitably permeating healthcare at an unprecedentedly rapid pace.[38] This reception study provides one group response to change in a single, rural practice of PCPs. This transition across America was encountered by one patient, one physician, one practice, and one community at a time.

Rural Physician Interviews: Broadening the Perspective

Although the case study on White Medical Associates, PC, provided insight into the workings of a particular practice in transition, a broader perspective is needed on rural physicians in general representing those who were in various stages of transition, worked singularly or in a group, had hospital affiliation or not, were from different types of primary care backgrounds, represented different demographic backgrounds, and held various types of physician degrees (MD/DO). It was not known for certain which of these factors played a direct or indirect role in the ways people responded within this environment; so, it was important to at least note these as possible variables factoring in with the observational results.

In review, White Medical Associates, PC, represented the entire physician staff and the wife/office manager: There were two, male, internal medicine, medical physicians (MD).[39] Wayne was the senior physician who had been in practice for over thirty years and James, his son, was in practice for less than half that amount of time. Christine, a female physician who worked in the field for under ten years, was a family practice physician with a Doctor of Osteopathic Medicine (DO) degree. Sarah was Wayne's wife and the office manager, not a physician. All members of this group came from a previous practice except for Christine, who started new with the White group. All members therefore had previous experience with paper charts, little contact with electronic charts, and no real experience with electronic messaging with patients.

The purpose of this next section, is to go beyond this single-practice perspective. Again, it must be kept in mind that no matter how many physicians are examined, each in-depth perspective represents a part of the composite space. Together it is hoped they provide a sense of comparison and a better overall picture of what this environment was like around the time of the transition.

Subject Selection Criteria

This segment examines four additional physicians from the rural area of Johnstown, Pennsylvania, during the spring and summer of 2009, the period just after the HITECH Act had come out. The motivation in doing these interviews was to explore the overall usage of EHRs and online communication in the region. All were aware of my personal position as a manager of my husband's family practice office, all knew that my husband did not yet use EHRs at the time, and all agreed that their comments may be used in future research presentations and/or written documents.[40]

Unlike the White Medical Associates, PC, each of these narrators represented independent physician viewpoints. Some of them were independent practitioners and some were in a group practice, but none of the groups were studied as a unit. Only individual physicians were chosen from a variety of practices.

My key motivation in selecting these physicians was to represent as many different subgroups as possible. Availability and willingness to be interviewed were the two criteria that were most limiting in this project. That is, not all subgroups were represented, though reasonable differences did exist within this population of narrators. Factors considered in the selection process involved using a variety of primary care specialties, physician educational backgrounds (MD vs. DO), practice sizes, affiliations with hospitals, genders, ages, and experiences with technology—namely EHRs and online communication.

Vital to the selection was for the physicians to have had some sort of experience with EHRs and to have already at least explored them and been knowledgeable about them. The question of electronic messaging continued to be of key interest; however, it is important to note that the HITECH Act of 2009 had not fully outlined the detailed requirements for online communication with patients. The only thing that physicians knew they would have to do for sure was to purchase an EHR system, upload their charts over time, and begin making the electronic charts available to their patients by the time they applied for Meaningful Use. The term "Meaningful Use" was not discussed to any large extent by most practitioners. This entire process was quite new to everyone at the time—even to the lawmakers who were establishing the criteria for each stage of conversion. The notion of online communication, though discussed in the HITECH Act, was not at the forefront of all physicians' minds since they were most concerned first with converting their paper charts to becoming electronic.

Subject Identification

The first narrator, Deborah Smith, MD, Board Certified in Obstetrics and Gynecology (OB/GYN) was at the time employed by Conemaugh Health System in a solo practice, but she shared office space with a family practice physician who also worked for Conemaugh.[41] She also had been a member of a previous OB/GYN group practice at Excela Latrobe Hospital in Latrobe, Pennsylvania. As a physician only in practice for a little over five years, she had some experience working in university hospital systems that had preliminary electronic record-keeping and online resources. As a younger physician who tended to use online communication in her private life, she appeared to be quite open to using emails with patients. She did state that she was concerned about safety and privacy issues even though her patients frequently wanted to contact her via email. She did not yet have an EHR in her office, but Conemaugh at the time of her employment was considering using Allscripts, but no determination had been made officially. She seemed, however, to want to be very involved in the decision-making process. Overall, Deborah appeared to be a forward-looking physician who had a newer solo practice affiliated with the hospital. She was in transition to get EHRs, and she was very receptive and interested in new technology. Deborah was the only OB/GYN interviewed for this study.

The second narrator was Daniel Freedmon, MD, of Daniel Freedmon, MD, and Associates PC. He was a family practice physician who owned, managed, and directed an independent group of then seven physicians and four certified physician assistants along with multiple support services (such as x-ray equipment and blood laboratories), which Daniel owned and operated. All physicians working for him admitted to the Conemaugh Health System main campus. At the time, Daniel did not yet choose which EHR system he would be using for his practice. Surprisingly, he did not want to consider Allscripts, which was Conemaugh's choice at the time. He appeared to want to make his own decision about the product and did not want to be influenced by any outside sources. He was quite vocal about his overall perceptions about medicine, economics, politics, and healthcare in general. He strongly believed in technology as was evident in his up-to-date practice. Although he focused on technology as a teaching tool in the room with the patient (as in a large flat-panel TV to show patient results), he appeared to be adamantly opposed to any consideration of online communication with patients (other than their required access by law to a copy of their own charts). It is to be noted that Daniel's narrative—as with all narratives recorded in this study—spoke only to how he viewed the circumstances at that particular point in time.

The third narrator was Sam Jones, DO, of Jones Family Medicine, PC. At the time, he practiced with his wife, Mary Jones, DO, and both were Board Certified in Family Practice, Neuromusculoskeletal Medicine, and Osteopathic Manipulative Medicine. Also, at the time of this interview, the Jones practiced at two locations, one in Richland and one in Ebensburg. Sam was extremely candid in his interview, expressing strong feelings about the benefits of the overall inclusion of technology and health. He spoke of sharing emails with patients to some extent, working on his new EHR system, and addressing how the government had helped to play a hand in the overall advancements in health technology—particularly the conversion from paper to electronic charts. Only Sam, and not his wife Mary, was interviewed. It is important to note that Sam was extremely enthusiastic, open, and positive in his overall interview. He seemed to be very interested in the effects of technology and patient engagement as was evident by the specifics of his interview.

The fourth narrator was Martin Evans, DO, who had practiced in Seward, Pennsylvania, with over thirty-five years of experience and admitted to both Conemaugh Memorial Medical Center and Indiana Regional Medical Center. He was Board Certified in Family Practice and Geriatric Medicine. At the time of the interview, he was also in practice with another osteopathic physician. Martin stated that he was one of the first physicians in the region who applied for designation as a "medical home,"[42] which was his newest venture at the time of this interview. His practice had had an EHR system in place for several years, and he seemed to be quite computer savvy. He appeared to be strongly opinionated about the governmental mandates and changes in healthcare today, stating that he believed in many of the changes in electronic charging but was at times disappointed in how slowly things were progressing across the nation. He was quite ahead of any of the other physicians who were interviewed at this time in that he was literally the earliest adopter of this group (including the White Medical Associates).

Each of these physicians seemed to be knowledgeable about the transition to electronic records and were in varying stages of adoption. Some appeared to favor the changes and others resisted them. In all, this group seemed to be a reasonable representation of what some physicians in rural America were thinking, feeling, and doing in response to the HITECH Act.

Methodology: Oral History Study

The procedure for conducting the interviews was like what was followed in the White Medical Associates, PC, case study. All interviews were recorded electronically in the presence of each narrator with their recorded oral consent for use of the materials for educational purposes. A series of open-ended questions were used as a springboard in hopes of exploring (1) where each practice was in its implementation process, (2) what experiences the users had with the new medium of EHRs, (3) how the users felt about the process in light of the government mandates for requiring electronic records, (4) where they felt technology might be headed in the near future with medicine and communication, and (5) how much and in what way the users exchanged emails (if any) with patients. Although most of these questions were asked, narrator responses helped gauge the flow and direction of the conversation. The goal was to capture how the narrators navigated through the medicological environment and their feelings and reactions to the process. All interviews were about an hour in length, and all took place in the office of each physician around the time of their daily office hours. All physicians gave permission to be identified and for the sharing of the information. All expressed curiosity and strong interest in the topic at hand.

Interview Process and Data Collection

Interestingly, despite how excited the physicians appeared to be about discussing the effect that the HITECH Act of 2009 had on their own practices, they did not feel that their patients were all that interested, aware, or concerned about the changes. It certainly seemed that their own livelihood was significantly altered due to extra costs in purchasing software and new systems, stress of learning a new system (or even how to type), time restrictions in treating patients, training costs for the staff, time involved in deciding upon which EHR system to choose (if not already purchased), anticipated or actual problems with implementation, and overall demands of the government on their practice management. However, when asked how their patients felt or experienced this change, they expressed that they were not aware of any real effect it had on them at that time. This is a particularly interesting observation since the medicological environment is a system, and systems do not just affect one component part (the physician) but all working parts, especially the patients. Then again, perhaps what the physicians were trying to say was that the patients did not understand what this transition meant to them as yet, that the patients had not really asked for these changes in technology, and that they, therefore, were not yet concerned. The people who had to take the initial step toward change (the physicians) were the ones who were the most aware at this given moment in time.

For the most part, those physicians who appeared to be the most concerned with the transition, such as Daniel, were the ones who commented the most about patient apathy, implying that the patients appeared almost devoid of the situation. In the media, the patient focus on healthcare at the time seemed to surround equal opportunity for gaining health insurance (“healthcare for all”); but even that attitude was not being discussed by the physicians (perhaps because most of the patients who were seen by the physicians had health insurance already). The thought was that, for the most part, patients simply were not that concerned with what was going on because the real burden at this time fell on the physician to begin the transition. No one was mandating the *patient* to change. The government mandates were being directed toward the *physicians*, as they were the players necessary to push forward this new technology in healthcare. According to the physicians interviewed, the patients rarely, if ever, asked for electronic copies of their health records. One may surmise that perhaps this was because the patients did not even know that such copies were something that they *could* ask for from their physician.[43] When something does not directly involve a person, it may fall out of awareness. In a sense the technology seemed to be driving the change (the ability to record, store, and communicate with health data online) more so than the people were driving the technology (asking that such services would be made available such as recorded CDs or emails with physicians). Granted, this does not mean that all physicians were questioning patient involvement and that no patients wanted these services. Rather, these physicians interviewed did not seem to think the focus was on the patients demanding change but instead on the government and technology itself driving that change.

At the same time, despite their perception of patient lack of interest in EHR technology, the physicians did for the most part sound excited about the overall attention to their profession. Of all these narrators, only Martin had completed the process of full EHR adoption, and he did his conversion well in advance of the mandates. Yet he too realized that he might have to make additional changes. In short, the physicians were cautiously excited about EHR adoption in light of patient care, were considerably interested in talking about this topic, and felt that patients for the most part were not all that aware of what this change might do to the face of medicine in light of costs, security, safety, basic patient care, and communication in general.

Emerging Themes

Upon reviewing and compiling the many comments made by the four narrators, certain themes emerged during the interviews. The three broader perspectives had to do with physicians' (1) concerns about the practical needs surrounding the transition, (2) anticipation of the future effect this transition would have on the face of medicine, and (3) overall desire to appear up-to-date with changing times. After analyzing these categories more closely, it was determined that five specific factors or variables relating to these overall themes were discussed by the narrators: (1) time, (2) cost, (3) security/liability, (4) computer presence in the examination rooms, and (5) communication.

One of the most concerning issues for physicians was the dilemma of time. Any change to their schedule meant time lost or gained. When physicians were late, patient aggravation and frustration became a serious issue and reflected upon patient satisfaction and quality of care. When physicians had emergencies, delays due to computer or power failures, or unexpectedly complicated patients scheduled too closely together, the amount of time that patients had to wait increased. At the same time, if a physician did not schedule enough patients per hour or if patient cancellations occurred, then costs increased while revenues decreased.

Time gained and lost created a vicious cycle, something about which each of the narrators commented. Above all, time factors weighed most heavily in the development and maintenance of effective physician/patient relationships, which in the long run affected patient satisfaction, safety, and overall health (Dugdale, Epstein, & Pantilat, 1999). If EHRs were to benefit patient care and improve communication overall, time needed to be used effectively. The question is, how can a physician balance the needs of the patients with the amount of time scheduled for each patient and with the amount of time necessary after office hours to continue to input data on patients and communicate online outside of the office visit? Time indeed was a complex factor in the overall practice of medicine; and EHRs entering the picture inevitably altered this time factor as well.

Sample comments from narrators fell into two categories: (1) hope for gain of time in caring for the patient and (2) concern for time lost when using EHRs and online communication. Deborah and Sam were the two physicians who thought that time would be saved with the use of EHRs. Deborah stated that she felt that it would be “faster to do a review of systems, especially with complicated cases” (Smith, 2009).[44] She believed that the checkboxes associated with EHRs would allow for improved speed. Instead of having to write down each of the areas of the review, one could just check it off (in the preprogrammed checkbox) and move on to the next point. Sam agreed with this as well, stating, “Each [EHR entry] is not a blank piece of paper that gets reinvented for each patient with every disease. . . . [You] laboriously write everything down. Where this way, what it would allow you to do is actually renew the last office visit that has all this information. . . . You now don’t write all that stuff down” (Jones, 2009).[45] Both physicians saw the checkboxes, the ability to cut and paste notes, and/or the existing information from the last visit already electronically recorded in the chart as possible ways to overcome time restraints while reviewing and preparing the electronic chart. Both agreed that this would be a time saver. Sam stated, “There will be more time spent with the patient and less writing.” Deborah expounded, “You have more time to see the actual physical problems that need hands on in the office. . . . Time restraints are the learning process, the learning curve.” By this she meant that, overall, physicians need to learn how to use EHR systems in a manner that will help them improve their efficiency. She believed strongly that once the learning curve improved, the medium would reduce writing time and allow for more time to be spent with the patient.

Issues brought up concerning time lost were mentioned as well. Two very practical points were made: Deborah stated, "You have to know how to type" and Sam noted a limitation, "if you're on dial-up . . . but pretty much not a factor now." Not all users were good typists, especially older physicians, many of whom relied for years on portable dictation equipment, transcriptionists, and secretaries. Typing speed may not be an issue for those younger physicians who grew up on the Internet and writing word documents, but it certainly could be for older ones who were not exposed to so much keyboard experience.[46] Likewise, the issue of dial-up versus broadband was quite important as evidenced by the ongoing push for improved broadband coverage in rural areas. It was a serious concern for the implementation of EHRs in rural areas throughout the Johnstown region.

Even more importantly, Daniel made a very pointed comment about EHR input of data: "There is too much wasted time. I would rather have the nurse say the patient is deteriorating in two sentences than for me to . . . read all this redundant stuff every day and find nothing" (Freedmon, 2009).[47] Daniel was referring to how physicians had to read the notes preentered into EHR systems upon entering the patient room. Previously, nurses simply wrote the condition of the patient briefly on the chart and orally mentioned key points on the doctor's way into the patient room. Now the doctor had to spend time reading over the plethora of often-repetitive electronic data entered in EHRs and trying to determine the most pertinent information. Physicians remained responsible for the data entered by their staff. They were liable for what had been entered, and they had to "sign off" on these entries indicating that they did read them and approved of their accuracy. This could become a slippery slope in that a lot of electronic information was produced and documented by nurses and other staff members. The systems themselves provided long lists of checkboxes that needed to be covered pre-exam by the staff member who was preparing the patient for the physician. In fact, there was so much documented that the physicians may have had trouble reading it all within the *time limits* of the office visit. Without key information highlighted verbally, they ran the risk of missing something. So again, it was a time (and in turn liability) issue that posed extensive concern within the office.

Daniel also noted the common concern of copy/pasting from one to another chart when using EHRs. Some had appropriately referred to this as "sloppy and pasting" (O'Reilly, 2013). Others did an altered version of this on voice recognition systems by "code dictating," which allowed the person dictating to say a single word or phrase to elicit an entire segment of commonly used information that was typed automatically into the system.[48] In either case, large sections of text are repeated from a previous visit without changing it at all to note specifics of the new visit. As Daniel stated that the possibility of error in communicating in this fashion was all too great. Physicians who read the same exact wording on a report or letter from a referred physician may glance at the note, see that it is the same, and never actually read the details concerning the particular patient's needs. The repetition tends to promote skimming or ignoring details which supports the assumption that "I have already read all this; it is the same anyhow." However, medicine is not an exact science and no two cases are exactly the same. Repetition such as this can save time but also can invite error, carelessness, safety problems, and even lawsuits. Thus, Daniel made a strong and valid point about how EHR documentations were being misused. However, he added, if they were used correctly without this copying and repetition, EHRs could be quite effective. This suggests that the problem had more to do with user issues than medium deficiencies. If such shortcuts were being used to save time, then how much time would be saved if the patients' care resulted in injury, misdiagnosis, or death? Resulting lawsuits also take a lot of time (not to mention money and potential harm to the patients).

Time certainly was a critical factor in this environment, especially when time meant reducing the amount of time spent after hours charting lengthy reports.[49] Time most definitely was a concern for many physicians attempting to adopt this new technology (Poissant, Pereira, Tamblyn, & Kawasumi, 2005). In fact, if so much time was being used in entering data, how much time could there be left in a day for physicians to respond to electronic messages once the secured portals took hold? This was a legitimate concern. Time indeed affected how well this new form of communication within the healthcare profession would ultimately survive within the medicological environment—with or without electronic medical messaging.

The three physicians who had not yet implemented their systems (Deborah, Sam, and Daniel) expressed genuine concern over the costly decisions involved in choosing the right system that would both be cost-effective, easy to navigate, and overall helpful to the practice itself. Daniel had already picked out an EHR system but had not yet implemented it because he realized that it was a huge economic decision in which many of his employees and partners would be involved. He stated that he spent a tremendous amount of time researching various systems; and he was in no rush to make a rash decision when so much money and overall office functionality factors were at stake. Even when these decisions were well thought out, many found that more than one EHR was replaced before the practice (or hospital system) was satisfied with functionality of the system.[50]

Although the situation with costs and EHR changes was discussed in part in chapter 3, it is important to note that the situation continued to be in a state of flux within this environment. Considering the anticipated absorbent cost per physician in EHR vendor purchases with nearly 45% of physicians spending more than $100,000 and 77% of large practices spending nearly $200,000 (Verdon, 2014), there was good reason for physicians to be so concerned not only about the cost itself but also about the choice in making the best decision for the practice. Once implemented, the concern was whether the costs would be made up by the number of patients seen. Even this was a huge concern when most physicians were reducing the number of patients seen per hour due to their inability to adapt to the demands of EHR programs. An example of this was cited in Verdon (2014) in which a provider stated that previously thirty-two patients were seen per day per physician with the help of one technical assistant and, later, with EHRs only twenty-four were seen with four technical assistants. Costs per physician for transitioning to EHRs was quite startling, and not all physicians once converted were all that happy with the results (Verdon, 2013). By 2014, 67% of the respondents to a national survey conducted by the research firm, MPI Group, and *Medical Economics* stated that nearly two-thirds of the physicians would not make the purchase again if they had the option to do so due largely because of poor functionality and high costs (Verdon, 2014). If this was the case, then costs not only were concerning considering the initial decision-making process but also considering the possibility of having to make a second EHR purchase in the future.

Daniel commented on this cost and decision-making aspect: "To spend all this money so that people can go online and access it; I just don't see how that's going to improve their quality of life or their quality in medicine or decision making . . . and for what? What goal are we trying to achieve?" It was apparent in this statement and throughout his interview that he was frustrated with the expense, with being forced into the conversion to electronic records, and with the concern that despite all this time, effort, and money, patients may not have better care. He repeated that he felt patients did not necessarily want online access, indicating that the physicians and patients were not the ones driving the medium. To Daniel, it was the government who was forcing this transformation; and he apparently was not happy about this.

Sam also spoke ill of the cost factors. His concern was in reference to the insurance company involvement: "So the idea here is that it's really not about the quality of medicine, it's about sitting down and trying to outwit the people that are out there practicing just so you can take the money off the table." What he implied by this was that patient care was not necessarily improving as a result of all these added costs and that outside forces such as insurance companies and government offices (such as Medicare and Medicaid) were determining reimbursement levels for care. In order to break even or make any profit, the physician had to show that he was doing a certain amount of work to merit a certain reimbursement level (represented by an ICD-9 or ICD-10 code that the system read and recorded in EHRs). How much physicians reported that they did provided the evidence for how much they got reimbursed for their work. Sam was not beginning to suggest that he himself was scamming the system; rather, he was saying that the pressures imposed upon physicians were forcing them to have to know how to code well in order to get financially compensated. This factor was not something that Sam had bargained for when he made the decision to convert to electronic records.[51]

In terms of security and associated liability issues, all the physicians expressed strong feelings of concern. Interestingly, their focus was on information access and the use or misuse of that information for various purposes. Certainly, there had been ongoing concerns about breaches, laptops being stolen, and outside sources stealing identities. For example, hackers made headline news with the August 18, 2014, U.S. Securities and Exchange Commission Form 8-K (Commission, 2014; Perlroth, 2014) report of a large hacking of over 4.5 million patient records from outside sources (this time China) occurring in April and June 2014. This was an ongoing federal law enforcement problem, and it did not appear to be going away any time soon since health records contained personal information easily used to steal identities for insurance fraud and the like.

Interestingly, the hacking issue was mentioned only by Martin (Martin, 2009), who stated, "If some 16-year-old kid can hack into the computers and put a virus that kills everything, who else can?"[52] Perhaps the fact that this was not brought up by the other physicians may have been because fewer breaches had occurred in 2009 than they did in years to come. At the time, there were few hospital systems and large office practices that stored data online because the requirements for Meaningful Use were just coming into play and adoption levels were barely on the rise. Looking ahead, however, Martin, who had been using EHRs for about ten years by that time, seemed to be quite aware of the potential havoc such breaches could cause.

What seemed to bother all the narrators the most was the idea of being "watched" by outside sources such as the government, insurance companies, and legal authorities. They were worried about who would be looking over their shoulders assessing what they were doing and how this information might be able to be used against them—particularly from a litigation point of view. As Daniel stated, "I'm sorry. EMRs will help increase litigation. . . . We're going to be losing one-on-one with patients. They're going to be looking for problems." He seemed to fear that patients would be more interested in what was said about them in the electronic charts than what the physicians said to the patients in person during their office visits. He expressed fear of a patient "looking for problems" and implied that these problems would find themselves in the hands of eager malpractice lawyers who also would read the charts and find ample documentation to sue physicians.

This seemed to support early concerns discussed at the time by Hoffman and Podgurski (2009) in their legal report on "E-Health Hazards" in which they discussed how improper documentation and handling of EHRs could lead to significant liability consequences. The fear was real not only in the minds of these narrators but throughout the entire environment. This was a primary example of how the environment was directly affected by multiple specialty groups that had an ongoing, direct impact on the responses and actions of the physicians and related healthcare decision-makers.

To the narrators, the fear of litigation appeared commensurate with the fear of the government finding its way into the electronic charts of patients. Sam stated, "And real soon what's going to happen is there's probably going to be a depository where these notes find their way into one government record thing." In saying this, Sam seemed to imply two things. First, he seemed concerned about insurance companies gathering data on physician practices to determine how effectively they were treating patients. Second, he seemed to be pondering the possibilities of large data banks of information being stored and analyzed through word recognition programs that data mine huge quantities of compiled information from physician-produced charts from all over the country or world.[53] Either way, there was the sense that Sam was somewhat uncomfortable with the uncertainty of what someone might do with so much private information. In a world of hackers and breached security, this certainly was a legitimate concern. Once the control and/or ownership of the chart left the privacy of the physician's office, the information no longer was reasonably safe within the walls of the practice. Now the entire world could access the information online with unimaginable (good and evil) consequences. This was why the concern for security and privacy was so great and likely what Sam was concerned with in his response.

Yet, despite these implied concerns, the narrators did seem to hold some hope for the future. Deborah stated that with so much data being recorded in the patient chart in every suggested category or list that EHRs provided, there was likely less of a liability concern since "more documentation is there." Martin also added that "Once this is signed off, it is totally proof. You can't do anything with it." He had once been accused by a lawyer for altering the chart, but he attested that this was not possible. He explained that EHRs were as permanent and unalterable as sent emails. There was no way to retrieve and change them once they were submitted or "sent." The electronic chart had to be "signed off on" by the physicians both for their own entries and for their staff's. In doing this, it acted as proof of review and final documentation. If something was entered incorrectly, it was difficult to make the change and the "trail" of even trying to make that change was likewise documented in the electronic chart.

As secured portals became popular and online physician/patient interactions within EHRs continued, charting rules were like eMessaging rules. The message was received by the practitioner, read, signed off on as "received," and then entered as a permanent part of the chart. According to Martin, this was an advantage in that it acted as living, lasting proof of what was written. This documentation, he felt, would be an asset in the court of law. He stated that all information was likewise "easy to find, easy to read, organized, efficient." This seemed to be a plus overall from the standpoint of liability, at least in the eyes of Martin and Deborah. The others were not as sure as to whether legal problems were in any way thwarted by the presence and use of the electronic chart. Certainly, there were both positive and negative factors that needed considered.

Like the discussion with Wayne White in the earlier case study, the idea of bringing in computers into the patient room seemed to be a concern with these narrators. Some had tried it but did not like it. Martin said, "I started taking these into the patient rooms, but you lose eye contact with the patient." He opted to put in his information after he saw the patient instead of during the interaction. This revealed an interesting parallel between Wayne and Martin, who both adopted the EHR medium ahead of the curve by doing so prior to the HITECH Act when few rural areas were willing to take this step forward with technology. They were not forced to take on this expense; they did it because they chose to do it. Because of this, they had the opportunity to pretest patient response even before computers were acceptable entities within physicians' offices. They attempted to bring the computer into the room with them and found that it interfered with the one-on-one interaction with the patient. Interestingly, after their personal trial, they both chose to quit using the computer in the room with the patient. Martin added, "Sometimes you can smell it and know it is strep. . . . Medicine is a big touchy-feely thing. . . . You have a license to touch." Of course, Martin was an osteopathic physician who believed in hands-on therapeutic manipulations as part of his treatment. It is hard to imagine how osteopathic manipulations and EHRs even could be used at the same time. To Martin, practicing medicine was about the physical observation and manipulation necessary to provide outstanding care. He chose to leave his computer outside of the room because he felt that will afford the best possible care for his patients.

Others agreed with Martin's concern. Daniel commented, "Seeing, touching, feeling, and listening to [your patient] is more important than to work on pushing buttons in an [EHR] system." Sam also contended that there was an "enormous amount of attention to the computer" when it was brought into the patient room. He felt it would be “a struggle to maintain the relationship with the patient and not have the computer be the focus of the evaluation and management.” Of course, both Daniel and Sam had not yet fully implemented their EHR systems, but it appeared that they were not convinced that using a computer in the room with the patient would be an advantage.

Finally, only Deborah seemed to be at all receptive to the idea. Her thoughts were that physicians needed to be open to this change and to experiment with what worked best for the patient. She believed that once she implemented EHR use fully, she would try to use a computer in the room in conjunction with a lot of face-to-face eye contact and the physical exam. To her, physicians should strive toward finding a “happy medium.” She said that she had already taken her laptop into a patient room and, so far, it had not become an issue for her.

Of all the information provided in these oral histories, the most fascinating discussions seemed to come at the end of each meeting at which time the narrators appeared to relax and speak more casually and surprisingly favorably about the medium they had spent quite a bit of time complaining about throughout the beginning of each interview. Whether or not they simply wanted to end on a positive note, there were several factors surrounding communication, education, and information that seemed to stand out.

To begin with, despite the problems they attributed to the physical presence of the computer itself, the narrators felt that the medium could provide an excellent opportunity for facilitating educational communication with their patients. Daniel, who for the most part seemed to be frustrated with the demands of online interactions with patients and the sharing of chart information online, did express wholeheartedly how excited he was to use advanced computer technology during the office visit. He referred to the availability of materials online and in electronic forms as being tools for teaching rather than materials for patients to gain information on their own. He felt that physicians needed to explain test results and health issues visually to their patients to help them better understand the complexity of their particular problems. He stated that “information over time is going to be our friend.” He was not so much in favor of laptops recording EHR entries in the middle of patient visits, but he was excited about adding additional equipment in the patient rooms to help display the materials from the electronic charts for the patients: “The ultimate would be where I have a touch screen plasma TV in each room that’s 46 inches big, and I sit down with the patient and I say, ‘Okay, let’s look at last time.’ Boom, it comes up. And we’re both looking at it together.” This is reminiscent of the discussion that Wayne had in the previous case study in which he did the same thing but with his own computer laptop. Wayne said that he sat next to the patient on the exam table, showing them things on the Internet to help explain their problems. With a forty-six-inch screen or an eighteen-inch one, the concept was the same. These physicians felt that the Internet and information available in EHRs could facilitate the patient visit.

This notion of working with the patient was carried through outside the office visit as well. Martin stated, “We need to teach information and how to seek it.” Deborah also added, “Do no harm means to inform them, to keep them away from bad information.” The idea was that patients could look most anything up on the Internet; but if Internet information was not accurate or was incomprehensible, it would not benefit the health or well-being of the patient. Clearly, the role of “teacher” seemed to be coming through the narratives of these physicians. They did not seem to be at all opposed to patients understanding their health issues; they just did not want to supply information in the electronic charts that could be misinterpreted since the original chart was written in a format that was more intended for physicians than patients.

This problem was formally addressed and supported in the literature. Holmes (2011a, 2011b) wrote two articles which helped to outline how physicians should document information inside of EHRs in a manner that facilitated convenience, clarity, good organization, and legal savvy. The patients’ involvement in the charts was also mentioned. Holmes (2011b, p. 34) noted that some providers like Daniel were concerned that “patients may not understand the medical jargon and react badly to diagnoses they perceive as insulting, such as obesity or alcohol abuse.” The potential of this straining the physician/patient relationship existed; however, people reviewing their own charts could in some cases be helpful in that they could catch errors, provide clarifications, and add information that might be helpful. Holmes believed that the benefits outweighed the limitations.

As Deborah supported, “the patient has the right to review their records and to amend their records. It doesn’t mean they can change their records. . . . This will enormously increase the patient’s level of participation.” No matter how uncomfortable physicians anticipated this level of participation to be, it was a level afforded in EHRs, especially once secured portals came into play.[54] At the time of these interviews, few, if any, of the physicians were thinking about secured portals because they were part of the future mandates proposed for 2011 and beyond. However, considerable information was available to the physicians about how these portals would work in conjunction with EHRs. Holmes further discussed how these portals, which were intended in part to help the patient become more engaged in their own health, could actually be used in a way to keep patients more informed of their health and to teach them information within a contained, controlled environment, assuring that more accurate, preexamined information could be delivered to the patients as pertaining to their individual healthcare needs (2011b).

Another aspect of online communication also pertained to both patient involvement and physicians as teachers. Deborah expressed her feelings about EHRs and online communication by stating that physicians needed to communicate on multiple levels as *guides* helping patients with where to find information, as *consultants* by communicating through emails even after hours, and as *teachers* in clarifying confusing or misinformation provided either during the examination or in the electronic charts. She believed that those patients who were interested in emails were in fact “interested in their own care.” She said, “I need you to be a partner in this because it isn’t a one-time fix. This is a long going process of getting you better.” She felt that this approach was most important for complex cases. She stated, “I’m personally more of a ‘Work with me on this. This is your body. You take responsibility.’ type of physician.” In discussing especially complex issues after hours with her patients through emails, she felt she understood their problems more clearly and the patients felt more responsibility in helping her understand. She added, “I can see dialoging in there. I’m really liking emails. I’ve asked patients their comfort level with them and I’m getting good responses back because it’s a good dialogue between me and a few of the patients that I’m using.” To Deborah, the email or electronic message allowed for improved, extended conversation. Granted, not all physicians felt this way. In fact, Daniel stated, “In our practice, no emails. You call me. . . . it’d be a full-time job.” Apparently, eMessaging was not for everyone; but it was becoming a mandatory part of the HITECH Act—like them or not.

Even if not everyone was comfortable with all forms of communication with patients, one thing all of the physicians did agree on was that they cared about their patients and wanted to help them in the best way possible despite any personal conflicts or difficulties with the implementation and maintenance of their EHR systems. Indeed, patient care came through loud and clear as the one thing upon which everyone agreed.

Conclusions and Observational Notes

These four separate yet similar perspectives provided another fascinating glimpse into the thoughts, concerns, and needs of rural physician members of the medicological environment around the time of the HITECH Act’s implementation in early 2009. Both the White Medical Associates, PC, case study and this additional series of oral histories reveal that these physicians possessed a clear sense of compassion for their patients, a resolution to meet governmental requirements, a struggle in trying to keep up with the changes despite the financial and time restraints on their practice, and a willingness to share their feelings about this process in a candid, professional manner.

When drawing conclusions from this feedback, it is necessary to keep in mind that this group represented only those physicians who were making the decision to use EHRs at that given point in time. Those physicians who had not converted to an EHR system were not identifiable at the time since they themselves could not have known for sure if they would or would not adopt. In fact, there was no way of knowing (1) if these mandates would change at all in the near future, (2) if physicians themselves would change their minds over time about the adoption process, or (3) if extenuating circumstances such as health or retirement needs would affect their decisions. Indeed it would be quite interesting at the present time to identify those who chose not to adopt and to have them reflect back on the feelings and experiences they had had when this transition was first occurring. Certainly, such interviews would be helpful in understanding why they made this decision not to adopt and would provide an additional glimpse into other physician perspectives.

Despite this limitation, the most valuable part of these interviews was the fact that they were done at a unique and influential time in history on a very specific group of subjects. Indeed, to attempt to capture this same sort of interview now, long after the initial implementation phase, might result in somewhat different findings. When looking back on the past, memories are always somewhat clouded by present events, circumstances, and technological advancements. Likewise, due to the time factor alone, even if the narrators were asked to look back on their experiences, the results may not have been as vividly recalled. To capture the voice of these physicians at the time of the transition was very important and worthy of consideration as part of an ongoing inquiry into the thoughts, feelings, and experiences of those who continue to utilize EHRs and online medical communication. Each oral history is unique and provides additional perspectives that contribute to the composite memories from this point in time.

Likewise, as the interviewer and also a participant in this process (as manager of a family practice office also going through this transition to EHRs), it is important to note once more the effect of my presence on the interview results and conclusions I have drawn here. All narrators from both sets of oral histories knew my husband and me personally and realized that I could identify with and personally appreciate their comments. It is certainly possible that my own verbal and especially nonverbal responses to their questions may have affected their answers in light of what they may have thought I was looking for or thinking myself. Any response from any interviewer for that matter has an effect on the overall results of an interview and its interpretation. Despite these limitations and possible biases, the comments of the narrators for the most part stand alone as valid oral history insights into the perceptions of those who have experienced the transition into EHRs. All interviews appeared to be sincere, authentic, representative, and spontaneous. These observations represented primary source insights into what it was like to work within the medicological environment at that time.

SURVEYS OF RURAL PHYSICIANS

In order to capture the insights and views of a larger number of rural physicians, this segment used a standardized survey[55] to examine rural physician response patterns to EHRs and online communication with patients. The objective was to explore what a broader population of physicians in the rural area of Johnstown, Pennsylvania, was thinking and feeling about EHR adoption and the use of eMessaging.

In interpreting the results not only of the Oral Histories provided here but also of this survey, it is vital to keep in mind the overall climate that existed within the medicological environment in 2009. Inevitably, public media, physician-based economic and political publications, professional journals, and basic physician meetings within the hospital systems[56] all had a profound effect on how physicians perceived their personal interactions within this environment at this time. The next section goes into greater detail about these factors as context for the survey data that follows.

To understand the climate in rural medicine at this particular time of initial transition, this study explores physicians' perceptions of EHR usage and their likelihood of or prevalence toward adoption. The overall degree of "favorability" toward technology both inside and outside the healthcare profession was a reasonable item to measure as it attempted to show how well the physicians within this environment at the time felt about this change. The initial assumption was that if physicians showed favorability toward technology in general, they would be more likely to transition toward EHRs. The focus, therefore, was on EHRs and not specifically eMessaging. Although questions of online interactions with patients remained an underlying, secondary interest, it was most important to test the general landscape of the medicological environment at this particular point in time.

If physicians were not in favor of using the medium of EHRs, it was not likely that they would look favorably upon the use of eMessages between physicians and patients either. Again, no matter how compelling and preferred the online information was to me personally, electronic messaging with patients was not the main focus of *physicians* at the time of this study, but EHRs were. Therefore, they had to be the key focus of this survey as well in an effort to draw physician interest and response. Favorability toward the medium helped to measure willingness to welcome the new medium of EHRs and in turn facilitated not only electronic record-keeping but online, secured portal messaging as well.

Therefore, this survey examined usage patterns in comparison to *physician perceptions of patient use* of technology, *favorability toward the medium of EHRs*, and *differences between PCPs and specialists.* In the oral history segment, only PCPs were interviewed since they were considered to be the most immediately and adversely affected by the mandates. However, with this survey, these groups could easily and efficiently be questioned about their perceptions and usage patterns all at the same time, drawing from a broader overall population of physicians.

In keeping with quantitative health survey methodology (Fowler, 2009; Aday & Cornelius, 2006), preliminary questions, relationships, and assumptions were considered to help shape the survey development. Upon consideration of the then ongoing oral history interviews of physicians in the rural area as well as my personal experience interacting within the medicological environment, several relationships between aspects of favorability (desire to move toward EHR adoption) were noticed. Although multiple hypotheses were tested, six in particular having to do with physician favorability with EHRs seemed most compelling:[57] (H1) The more favorably physicians feel toward technology in everyday life (outside of the medical profession), the more favorably they will feel toward technology (computers, Internet, PDAs,[58] EHRs) within the practice of medicine. (H2) The more favorably physicians feel toward technology in healthcare, the more often they will use EHRs overall. (H3) The more favorably physicians rate their usage of technology in non-work-related areas, the more often they will use EHRs overall. (H4) The more favorably physicians rate their patients' usage of technology, the more often they will use EHRs overall. (H5) The more favorably physicians feel toward EHRs overall, the more favorably they will view the effectiveness of EHRs for quality patient care. (H6) PCPs will be less in favor of EHRs in offices today than will all other specialties.

The Method

This survey collected data from physicians of the Conemaugh Health System's Memorial Medical Center in Johnstown, Pennsylvania (notably, prior to the Conemaugh jointure with Duke LifePoint on September 2, 2014). This rural community, spanning across all of Cambria County and parts of Somerset County, drew from a region of approximately 22,000 people who were largely serviced by this hospital system. It had provided care to about 25,000 inpatients and 500,000 outpatients (Conemaugh Health Systems, 2014). Although some patients frequented other rural area hospitals such as those in Windber, Indiana, Somerset, and Bedford, most sought their care through this hospital system and frequently obtained more subspecialized care from such cities as Pittsburgh, Baltimore, and Cleveland. Therefore, the target population for this survey was limited to all physicians who admitted patients to Memorial Health Center around the time of this study—whether or not they had voting privileges at this facility.

In an effort to collect a large-enough sampling frame, this study utilized the Conemaugh Memorial Medical Center's most recent courier list of all physicians on active and courtesy staff as of September 4, 2008. Initially, 393 surveys were distributed to each physician office or hospital mailbox in an interdepartmental envelope with a folded, self-addressed, return interdepartmental envelope inside along with the actual survey booklet. Maintaining anonymity of physicians was achieved with no request of names on surveys nor any return addresses on the interdepartmental envelopes. All mail was sent out from and returned to J. Eric Wieczorek, MD's private family practice office which was a member of the courier service. Of the 393 total surveys distributed, 81 (21%) were marked undeliverable, resulting in a total of 312 eligible surveys. Of these eligible surveys, only 84 (27%) were returned.

All questions on the paper/pencil, Likert scale survey were designed to gather data on what variables affected physician decision-making in light of technology and EHR adoption. The previously discussed oral histories conducted between January and February 2009 preceded the actual creation of the survey and were therefore informative in helping to shape the style, organization, and content of the questions. It should be noted that all the physicians interviewed in the earlier discussed oral histories were also included in this sampling frame since they too were members of this rural community of physicians who admit patients to Conemaugh Hospital.

The Results

In exploring the existing rural physician climate just prior to the HITECH Act of 2010, the underlying question was "What factors involving physicians' perceptions best contribute to the likelihood of their adopting EHRs?" In testing each of the six related hypotheses, the landscape was revealed.

The first hypothesis predicted that the more favorably physicians felt toward technology in general, the more favorably they would feel toward technology in the practice of medicine. Overall, physicians were found to be strongly in favor of technology represented by a slightly higher mean for their view of technology outside of medicine (3.69/4.00) than for within medicine (3.47/4.00). Only two physicians were totally against technology in medical practices and no one was totally against technology outside of medicine. This observation was supported through cross tabulations with 100% of all those who were at all against technology in medicine still for it outside of medicine. On a whole, only 7.2% of the physicians were either against or moderately against technology within medicine, while 92.8% were moderately or totally for it. Likewise, 1.2% were moderately against technology outside of medicine, while 98.8% were moderately (28.6%) or totally (70.2%) for it. These results dispel the thought that rural physicians at this point in time were not interested in the use of technology itself. Any resistance toward EHRs may have more to do with EHRs themselves than toward technology overall. Hypothesis 1 therefore was a moot point since rural physicians were significantly skewed more favorably toward technology whether or not they supported it in medicine.

In comparing physician favorability toward technology in medicine and their use of EHRs, it was found that despite the fact that physicians said they overall favored technology in medicine, the responses were quite polarized concerning use of EHRs, with 42.9% indicating that they never have used them and 38.1% stating that they used them all the time. Using cross tabulations, a relationship was identified between those who were “totally for technology” and those who used EHRs “very often.” Of note are the results indicating that 33.3% of the physicians who never used EHRs were totally for technology and 52.1% of those who used EHRs often were totally for technology. This suggests that the more rural physicians were exposed to EHR usage, the more favorably they ranked technology, thus reasonably supporting the second hypothesis.

In light of how physicians rated their usage of technology in nonwork-related areas and how often they used EHRs, results indicated that physicians used technology and the Internet for nonwork-related tasks such as for email, research, electronic games, purchases, driving directions, and surfing the web a moderate amount with a fairly normal curve with “not often” and “sometimes” being the midrange norm. Opposite of this was the use of EHRs. Physicians used them either very often or never. There appeared to be no significant relationship between the use of EHRs and the personal use of technology. Therefore, hypothesis 3 was rejected. Rural physicians still rated, overall, the use of EHRs positively even though some did not use technology at all.

Hypothesis 4 stated that the more favorably physicians rated their patients’ usage of technology, the more often they themselves used EHRs. This data analysis required a collapsing of the data and a shrinking of the total value from n=84 to n=45. Since the use of the “I don’t know” category occurred thirty-nine times or over 46% of the time, the column was eliminated and only “none,” “very few,” “some,” “most,” and “all” were examined. Results showed that of the forty-five physicians who chose to comment on patient usage, they generally felt that very “few” or “some” patients used the Internet. Likewise, only one of the forty-five physicians surveyed thought that none of their patients used the Internet and only one of the forty-five thought that most used it, with 51.1% of physicians thinking that “very few” of their patients did. In an “age of media,” this reveals that rural physicians felt that over half of their patient population did not use the Internet for health-related or personal reasons.

When comparing these results with the use of EHRs (*n*=45), it was found that 55% of the physicians who used EHRs very often also felt that some of their patients used the Internet, while 65.2% of those who did not use the ERs thought that very few of their patients used the Internet. This supports the fourth hypothesis that there indeed was a correlation between how often rural physicians used EHRs and how they viewed their patient's use of technology.

When examining the fifth hypothesis (the more favorably rural physicians feel toward EHRs overall, the more favorably they will view the effectiveness of EHRs for quality patient care), physicians (87%) agreed that the use of EHRs improved patient care. Physicians (69%) felt that EHRs increased the quality of patient care, while only 31% felt EHRs decreased it. These rural physicians overall believed that the quality of care was improved by the use of EHRs. Additionally, of the physicians who rated EHRs in quality of patient care with a six out of ten or higher, none of them were totally against EHRs. This shows that physicians perceived patient care as a positive benefit of EHRs whether or not the physicians were for their implementation.

The final hypothesis predicted that PCPs would be less in favor of EHRs than would other specialists. It was assumed that PCPs would be different from other groups since they were the ones who incurred more personal office expenses and since the government mandates were beginning with this group. Interestingly, upon cross tabulation, the groups looked basically the same with no real difference between PCPs and specialists as far as their favorability toward EHRs is concerned. The hypothesis was rejected in that both groups looked almost identical.

The data was then regrouped into three categories. Since some specialists worked only in the hospital (emergency room physicians, radiologists, and anesthesiologists) while others had hospital and private offices (surgeons, cardiologists, gastroenterologists, etc.), each group was thought to represent a different level of use and association with EHRs. Upon doing cross tabulations, it was found that of the 12.2% of physicians who were either totally or moderately against EHRs, 50% were PCPs, 40% specialists with offices, and 10% specialists who only worked in the hospital. Likewise, of the 87.8% of physicians who were either moderately or totally for EHRs, 47% were PCPs, 35% specialists with offices, and 17% specialists who only worked in the hospital. Interestingly enough, although the PCPs overall were the group most in favor of EHRs, when comparing groups, it was found that the specialists who worked in and out of the hospital were more like the PCPs than were the specialists who only worked in the hospital. This suggests that costs incurred by individual office practitioners may have reduced the anticipated adoption rate for individual physicians over those associated with larger hospital institutions which typically bear the costs. Therefore, hypothesis 6 was also refuted.

Overall, PCPs actually appeared to have more interest in and willingness to accept EHRs than all other groups.

Implications and Conclusions

The most remarkable aspect of this study was the enthusiastic response by physicians from this rural community. With a return rate of 27% after only three weeks of sending out the surveys and with the number of personal comments and articles that the physicians sent along with them, the topic of EHRs apparently was of great interest to physicians at a time of significant transition and political change. Surprisingly, even those who wrote comments concerning the limitations of EHR systems and technology in general still filled out their surveys stating that they were either moderately or totally for EHRs. It appears that they had reservations but felt forced to accept or at least consider this change. As one physician wrote, "If EMR is mandated, what we think about EMR will not matter—it will be instituted." His words indicated a resolution more than a welcoming of this new technology. Even during a time of forced compliance and a lingering fear of costs, technological limitations, security, and healthcare reform, the direction was positive toward an acceptance of EHRs—even in rural America.

Capturing what physicians think or perceive to be the issues surrounding EHRs is relevant to understanding what really was happening at the point in time when this survey research was completed—a time in which significant transitions were taking place within the medicological environment. Although results of this data focused strictly on the six initial hypotheses and descriptive analyses of variables, many suggestions for survey improvement surfaced as well. This segment of research, like all research, is a partial view of the environment surrounding the implementation of EHRs.

In short, all six hypotheses focused on physicians' favorability toward technology both in the practice of medicine and in everyday life. It was concluded that favorability was high no matter how much they personally used any form of technology and how they viewed their patients' use of technology. Although it was assumed that physicians would feel more favorably toward technology within medicine if they were more accepting toward it in everyday life, no difference was found since all the physicians ranked technology very high in all areas of their life, including medicine. There was a difference however, in physician perceptions of their patients' use of technology. Physicians believed that more than half of their patient population was not technologically savvy; and, therefore, the less savvy they viewed their patients, the less likely they were to endorse the use of EHRs. Since all categories of media were compiled into one variable, certain forms of media usage such as using the Internet to seek health information may be more predictive than others. Further analyses may find that specific kinds of technology may predict favorability toward EHRs or medical technology in general; however, at this level of analysis specific relationships were not identified.

Overall, physicians were very much in favor of basic technological advancements; but they did not view their own patients as being nearly as interested in using technology as they viewed themselves. This finding speaks volumes about why one of the subtle arguments against adoption revealed in the oral histories (such as "patients don't want this for better care; the government wants this so they can interfere with our practice of medicine") is that patients are too old, inexperienced, or technologically challenged ever to want such a change. The argument seemed to be used as an excuse for non-adoption as if the patients, not the physicians, were holding up technological change within the medicological environment. In reality, this may or may not have been the case. The point is that the underlying perception existed in these rural physicians' minds. Accurate or not, their perceptions drove their anticipated action. This finding revealed a dynamic perceptual force within the environment that likely affected physician hesitance against accepting the transition.

Overall, favorability paralleled EHR usage. A slightly higher favorability toward EHRs was found if the physicians had already adopted or (to some extent) used EHRs even if usage was only in the hospital. It would have been helpful to identify where the physicians used EHRs. It is possible that many admitting physicians could have used some aspect of EHRs in the hospital but not at all in their individual practices. This might also have affected their overall perceptions of that technology.

The fifth hypothesis examined EHRs and their adoption/usage more specifically in relationship to quality of patient care. Most physicians felt that EHRs greatly improved quality of patient care. This hypothesis was supported and did predict EHR willingness to adopt. Again, perception plays a heavy role here. Physicians may have wanted to appear up-to-date and ready for change in a survey, but actions speak volumes with actual adoption rates not being as high as favorability rates indicated.

Finally, hypothesis 6 attempted to identify differences between types of physicians so far as their usage and willingness to adopt EHRs. Despite multiple attempts at regrouping the data, there did not seem to be any significant difference between the professions. PCPs were found to be more like other specialists who practiced outside of the hospital; however, all physicians were very similar in their positive feelings toward technology and EHRs in general.

Another more fundamental issue was how the physicians actually defined EHR *usage.* As stated in Jha et al. (2009), there seemed to be no clear definition of what was meant by using an EHR in hospital and private office settings. Some considered EHR usage adequate for simple x-ray and lab reports and some only scanned documents into electronic files (like the White practice), while others used full EHR capabilities. The question is, how indeed did physicians define EHRs? If their definitions were not all the same, the basis for comparison suffers. Indeed, the assurance that all physicians agreed upon what they were calling EHRs before they began the survey would have made for much more valid results. This study lacked this level of validity because it was not certain what physicians meant by "using" EHRs. Some said that they had "already implemented" EHRs but there was no real evidence that they had. Additionally, those in-hospital physicians in this study who said they used EHRs in the emergency rooms were in fact not really using them since Conemaugh Health Systems at the time did not meet the level of functionality typically designated as comprehensive or even basic usage (Halamka, Szolovits, Rind, & Safran, 1997; Jha et al., 2009).

If this survey could recapture the physician mindset at that point in time, it might first identify what the physicians defined as "using" EHRs. Many claimed to be on the cutting edge without really knowing what that "edge" entailed. This was a rural perspective at a time of transition. This at best captures that perspective in 2009. Repeating the study would not be possible since times have already changed. EHRs now include active use of secured portals and more active use of eMessages. History is clouded by present perceptions. The important thing is that what rural physicians thought during this time of transition had been captured to some extent in this rural research study.

Moreover, this study suggests that some of the physicians' concerns about effectiveness of EHRs might have been due to their lack of knowledge of and exposure to the technology itself and not to their firsthand experience with it. Comparing physician acceptance rates and accuracy of knowledge about the use of EHRs would have been helpful in determining on what basis the physicians who had not yet accepted EHRs made their decisions. That is, *where* physicians got their information and how accurate that information was concerning EHRs may likewise have had a significant effect on their feelings toward adoption. This study only looked at physician perceptions but did not examine how the physicians had acquired their perceptions.

The study of EHRs along with all other health-related technology is very important if changes are to be made smoothly, effectively, and efficiently in healthcare today. Many studies across the country and world (Martin, 2001) have addressed issues concerning everything from the Internet and EHRs to telemedicine and remote care. Most have focused on larger hospitals in urban areas, while few have addressed the personal needs of the smaller, rural areas. Perhaps the answer lies in the combination of data collection from each of these target populations in addition to more personal, multi-methodological studies that not only collect quantitative but qualitative and ethnographic data as well (Kreps, 2008). Capturing moments of time as they occur during this evolution would certainly be ideal and most reflective of how a medium like the EHR makes its way throughout the medicological environment. Whatever the case, the need for increased analysis and research on this process and its effect on the individual physician and patient holds great promise in knowing how change has and will continue to find its path through this dynamic environment in the past and years to come. The healthcare industry is ripe with promise. The path is continuing to open with more and more technology awaiting its future.

CRITICAL INCIDENT STUDY ON RURAL PATIENT RESPONSE TO ONLINE MEDICAL COMMUNICATION

In reviewing the research on rural physicians up until this point, it is intriguing to think what really existed in the hearts and minds of the patients themselves in rural America. The survey on rural physicians revealed *what physicians thought patients thought* (and, of course, what the physicians thought as well); but *what patients actually thought* was perhaps a different story. This segment touches upon this missing link of perception. It does so through yet another methodological approach: the Critical Incident Technique (CIT) (Flanagan, 1954).[59]

It is important to note that at the time of this study, I sought information on eMessaging because I believed strongly that EHRs provided the means for active communication between physicians and patients. As a faculty member at the University of Pittsburgh at Johnstown, I had ready access to large student psychology and engineering classes. I knew that college students were relatively active email users since they were all given a university account and were all expected to use it for classroom purposes. The question was, were they active users with their physicians? To my surprise, not only did the students say that they did not communicate with their physicians online, but they also said that they were not aware that patients *could* communicate online with their physicians.

This segment briefly outlines the subjects, procedure, and results of the CIT study conducted on college students from Pitt-Johnstown in the fall of 2009.

Subjects

Initial permission was gained through the University of Pittsburgh Institutional Review Board (IRB) for the distribution of paper/pencil surveys to approximately 125 engineering students and 580 introduction to psychology undergraduates at the Johnstown campus. Since student and faculty availability determined the distribution of surveys, only 108 engineering students from a single freshman seminar class and 184 students of varying academic backgrounds from three different introduction to psychology classes were given the survey. Students were between 17 and 20 years of age and entry-level students. No other distinctions were noted or recorded concerning the demographics of these student participants.

The convenience sample totaled 292 students, most of which were either freshmen or sophomore students. These students represented only about 10% of the total student body (approximately 3,000) at Pitt-Johnstown with 43% being engineers and the remaining being students of varied majors.[60]

Design and Distribution of Surveys

The CIT (Flanagan, 1954) was selected as the methodology for this study since it was hoped that students would talk about their experiences using online communication with their physicians. This technique typically solicits a wealth of examples about specific scenarios that are ranked as "outstandingly effective" or "outstandingly ineffective." It provides the data available for quantification of qualitative data sets by identifying specific actions or behaviors recalled by the subjects. The actions are categorized and then numbered to see which actions are most likely to lead to either extremely effective or extremely ineffective results. The technique elicits primary evidence from users. The objective was to identify what worked and what did not work when it came to online medical communication.[61]

To begin with, all surveys were labeled at the top of the page as "Doctor-Patient Electronic Communication" in order that students knew the specific focus of the upcoming questions. The "General Research Purpose" was stated as follows: "to identify specific examples of outstandingly effective and outstandingly ineffective electronic interactions between patients and doctors." To reduce any confusion, the term "electronic communication" was clearly defined as "any time you communicate directly with your doctor using such things as email, text messaging, blogging, Facebook, MySpace, Twitter, web pages, or patient portals."

Highlighted in the opening statement was a specific explanation of the purpose of doctor-patient communication.[62] The boldfaced statement on this survey was as follows: "The purpose of doctor-patient electronic communication is to create a collaborative environment wherein doctor and patient can exchange information and make decisions about the patient's health related problems."

After this, the survey explained what students would be asked to do, namely to discuss in writing their experience communicating electronically between themselves and their own physicians, between themselves and a family member's physician, or between themselves and a friend's physician. All such scenarios were spelled out in case students in this age group did not have as much experience in communicating with physicians. To be prepared for students to have no experience at all, the survey stated that if the students had no experience in communicating with a physician online, then they were asked to comment on how they *thought* such a communication should be conducted in an effort to reach the highlighted goal of information exchange and decision-making about health-related problems.[63]

Further explanation included who was being studied, why the students were named eligible for study, which pages were to be used if the student did or did not have prior experience in using emails with physicians, how no risks or incentive payments were involved, how names were not to be included to maintain anonymity and privacy of the completed surveys, who the contact person was (myself), and why it was important to realize that there are no right or wrong answers.

The survey then asked the two key CIT questions: "Think about the last time you communicated electronically with your doctor that was outstandingly effective in achieving the above stated goal. Describe the situation" and "Tell exactly what your doctor did that indicated to you that this was an outstandingly effective means for achieving the above stated goal. (Feel free to use the back of this sheet for additional comments.)" The same questions were asked concerning "outstandingly ineffective" as well on the following page. If students did not experience this, they then could answer the two sets of CIT questions based upon "imagining" what would be most effective and ineffective. Additional questions were listed concerning for whom the students communicated online (self, family member, friend), which type of communication was used in the interactions (email, text message, blog, Facebook, MySpace, Twitter, Patient Portal), which medical specialty best described the physician involved (family practice, pediatrics, obstetrics/gynecology, surgery, psychiatry), and in what area the student normally resided (rural, suburban, urban).[64]

Results

After reviewing the data, it was found that of the 108 engineering students and 184 introduction to psychology students who took the survey, none of them indicated that they had ever communicated online with their own, a family member's, or a friend's physician. Even for the students who listed themselves from urban and/or suburban areas (4.5%), none responded positively as to any form of online communication with physicians.

This meant that no firsthand critical incidents were reported about online physician/patient communication—effective or ineffective. The only responses obtained were the "imaginary" or hypothetical ones in which the students were asked to come up with an outstandingly effective and outstandingly ineffective example of online physician/patient communication.

Data was collected in this hypothetical category. All responses were recorded and grouped into emerging categories. The "effective" incidents fell under the descriptive categories of rapid *response time*, *clarification* of medication or health information from earlier visit, and ability for *visual exchange* of a photograph or image. "Ineffective" incidents fell under the categories of *lack of response* or no response, *inconvenience and irritation* of the physician for being expected to be online, irrelevant information exchange (*small talk*), and *emergencies* not dealt with on time. Although there were some responses that were left blank or that said, "Emails should not be used in medicine," for the most part, students filled in some information as to what their perceptions were of and what an outstandingly effective and outstandingly ineffective information exchange might look like. Interestingly enough, these responses resembled some of the fears of physicians expressed in earlier articles about the projected pitfalls and proposed benefits of such interactions when communicating in this context (Kane & Sands, 1998; Eysenbach, 2000).

Discussion

Although this CIT study resulted in no primary incidents, two important findings were made. First, even though students had no real experience with physician/patient online communication in the fall of 2009, they did have an inkling of what it should and should not be like as demonstrated with their hypothetical "incidents" in the survey responses. For whatever reason, students seemed to understand the basic concerns historically articulated by physicians. Could it be that they heard them talking or that they were reading the same literature as the physicians? This is not likely.

It is more likely that students were simply sharing what they already knew to be fundamental problems with emails and logically relating these to the setting of healthcare: Emails do not work in the face of emergencies. That is, if a person wants a quick response, even a text message is faster than an email. Emails are excellent follow-ups for in-person conversation. That is, if a friend gives directions for how to build a birdhouse or cook a favorite recipe and something is left out in the directions, the email is terrific for clarification. Emails with photographs or diagrams improve online communication. The visual plus the description allows for added understanding. Emails can cause additional time demands. A physician who may be judged stereotypically as late for office visits, missing important life events, and rushing from patient to patient would likely be even more time restrained with having to answer long emails from patients, especially if they were not clear, concise, and appropriate. The incidents students noted reflected typical problems about any email exchange and fundamental assumptions about the occupation of being a physician. Student responses were as justified as the ones physicians articulated. These were legitimate concerns of the very nature of online communication, let alone communication in the specialized field of medicine. They felt that physicians *should* cautiously approach online medical communication in an effort to best implement it within the restraints and demands of the context.

Second, no news *is* news. That is, the fact that no students were using online medical communication in the fall of 2009 at Pitt-Johnstown indicated that the medium was still very new in that rural area. The email as a medium was not new, but emails within the secured portals of EHRs were. This further justified why studying the introduction of this medium in rural America at the time of the HITECH Act's implementation was so relevant.

Possibly the critical incident study would have resulted in more information about online communication if it were repeated now in the rural areas since more students are starting to communicate with their physicians online. In my medical communication classes, I always asked students whether or not they interacted with their physicians online. In 2009, I got responses like "What? That would be really neat to talk to my doctor online!" and "I wish my doctor emailed me!" By 2015, I got that response much less often. More and more as the years progressed, I noticed even in Johnstown that students stated that they are communicating online with their physicians, utilizing secured portals for retrieving their medical information, and receiving text message reminders from their physician offices about appointments and health activities (like staying on a diet or checking ones blood sugar). Much changed over the past ten years, and much change will continue. What is intriguing is to identify what was happening throughout this transition process.

CONCLUDING REMARKS

This chapter has explored the medicological environment primarily from the physician perspective in the rural area of Johnstown at the time of the 2009 HITECH Act's implementation. The multi-methodological approach provided insight into the range of simultaneous forces that affected how physicians and patients navigated through this medicological environment in an effort to give and receive necessary healthcare. Each method of observation added to the understanding of the evolving processes at work at this point of transition. From my own personal experience, to the in-depth oral histories of physicians, to the broader physician surveys, and to the glimpse at student patients through the CIT surveys, each perspective added a dimension of understanding and appreciation of the situations, attitudes, and perceptions at work within this space.

It is not assumed that all of this environment had been examined—not by any means. However, each piece and each methodology used has led to a greater understanding of this complex, dynamic transition. This was a period of massive change and inherent resistance. Many factors contributed to the transition, but change itself was inevitable. And change will continue. It is what propels life forward with new enthusiasm and new fears concerning what lies ahead. Medical history is no stranger to change, no matter how resistant and at times slow it has moved. Much has developed in technology alone with the innovations of noninvasive laser and computerized surgeries, electronic gaming devices used for teaching and discovery, texting reminders for patient compliance, and social media incorporation into the essence of medical communication between physicians and patients. Much promise for the future continues as well.

However, no matter what promise the future holds from a medical and/or technological perspective, merit exits in taking pause to look at the layers of influence, the forces of change, and the situational circumstances that all affected the dynamic transition to EHRs and eMessaging between physicians and patients.

NOTES

1. See chapter 3 for updated information on current usage. It is important to show what the research environment looked like at the time of this study. Responses always reflect the given environment at any given point in time. Conclusions drawn are both reflective of and limited by the existing climate.

2. At the time, Google through "Google Health" was successfully getting patients to store their medical information through a specialized PHR program for private use. Although popular in 2009, this became relatively obsolete with the addition of secured portals, that is, a place for all health information to be gathered and shared (at least to some extent) by physicians, hospitals, and patients alike within a secured medium. Previously, patients could not access any part of their own medical charts. Now, of course, access is made available in many practices and hospital settings with the implementation of secured portals. It is to be noted also that Google Health was permanently destroyed, all user accounts eliminated, and all data systematically erased as of January 2, 2013. See http://www.google.com/intl/en_us/health/about/.

3. The Health Maintenance Organization Act of 1973 (U.S. Government, 1974) was introduced by President Richard Nixon as a means of revamping the high healthcare costs and assuring more people being allowed healthcare. (See http://www.ssa.gov/policy/docs/ssb/v37n3/v37n3p35.pdf.) The attempt did hold as HMOs to some

extent continue to exist but in altered form. Many subsequent addendums have been made including but not limited to the Health Maintenance Organization Amendments of 1976 (U.S. Government, 1976).), the Health Maintenance Organization Amendments of 1978 (U.S. Government, 1978), the Omnibus Budget Reconciliation Act of 1981 (U.S. Government, 1981), the Health Maintenance Organization Amendments of 1988 (U.S. Government, 1988), and, of course, the Health Insurance Portability and Accountability Act (HIPAA) (U.S. Governement, 1996).

4. Physicians could potentially manipulate the system to earn more money in less time by seeing patients less frequently and minimizing their office tests while still earning the same service fee per patient. This practice threatened to challenge the system and for the most part continued to be an issue preventing the non-fee-per-service system from garnering full support.

5. See Healthcare.gov for basic explanation of referrals at https://www.healthcare.gov/glossary/referral/.

6. This fear was heightened in the 1990s as echoed in the "Institute for Health Freedom" publication of March 29, 1999 (Brase).

7. Many of these hospitals, despite their *preferred* insurance, did accept other insurances. This is not to imply an "all or nothing" acceptance but rather to show that affiliations had power and that power also affected the environment in both rural and urban areas. In rural areas, however, the choices were fewer. That is, if a major hospital such as Duke LifePoint would come into a region (as it later had in Johnstown's Conemaugh Health System), it could limit and control insurance acceptance. This was an underlying concern of the various physicians and smaller regional hospitals of the Johnstown region. This was one key reason for their desire to unite. Acceptance of insurances and use of EHRs both were related in that they affected how well rural physicians could freely navigate the environment while still surviving as private physicians.

8. For instance, smaller surrounding hospitals such as Somerset Hospital had looked toward joining larger facilities (in this case, Conemaugh) in part so that they could access the Epic system of EHRs. To many, Epic was considered the "Cadillac" of EHR systems as stated in a private conversation with Craig Saylor, CEO of Somerset Health Systems, in a March 2015 personal conversation with him. It was thought that at the time Epic would allow his hospital to gain access to better interoperability in a system that had the potential to be "selectively closed" to outside practices. No solo practice could join the hospital Epic system without first joining affiliation (i.e., management/ownership) with that larger hospital system. The trouble was that with this transition also came the insurance company associated with the hospital. That is, in this case, Somerset Hospital would not only get to change their EHR vendor to Epic but they would also have to abide by any insurance limitations that Duke LifePoint had to offer. This complicated the decision-making considerably; and, at the time, Somerset chose not to join the Conemaugh Health System.

9. In a way, the perspective I have taken herein is that of the casual ethnographer. I am not a physician; I simply live with one. I never elected to work in Eric's office but did so due to financial and practical needs. I am a communication professional whose college and graduate education had nothing to do with the sciences other than

the required general education "distribution" courses. And yet I found myself deeply entrenched in the life, hardships, worries, and joys of what it meant to be a practicing physician during the HMO and EHR government mandates. In a way, I was immersed into the system and learned what it took to survive in it as an outsider looking in. As a researcher, I had an observing eye, was inquisitive, and was perceptive of the communication processes evolving within this new environment. Perhaps I was yet another part of the medicological environment, an additional influence myself in the ever-dynamic mosaic of this system of influence.

10. Additional versions and revisions of this research were presented in part (or in conjunction with other research projects) as follows: (1) "Communicating in a Technical World: Physician-Patient Challenges in Rural America Today" (October 2009) International Conference on Communication in Healthcare for the American Academy on Communication in Healthcare (AACH) as an Oral History and Quantitative, Multi-Methodological Approach Presentation/Paper at the conference in Miami, Florida; (2) "Research in Progress on the Transition to Electronic Medical Records in Rural Medicine: A Reception Analysis of How Physician's Perceive Patient Media Literacy" (November 2009) at an NCA round table discussion for Health Communication Division; and (3) "Physicians in Transition: The Voice of Rural Physicians in Response to Electronic Medical Records" (April 28, 2010) as a final paper presented at the Oral History in the Mid-Atlantic Region (OHMAR) Conference in Washington, DC.

11. It is to be noted that the motivation for studying EHRs from the start was always to look at physician/patient online communication. However, it was difficult to find physicians who did this because most at the time were not.

12. These specialties are considered the "generalists." There is some debate as to whether an OB/GYN physician is considered to be a PCP; however, most insurance companies do accept them as such since many women seek medical care exclusively by these physicians instead of also seeing a family or internal medicine physician.

13. Knowledge of this comes from personal discussions with a local podiatrist in the spring of 2009. He opened his computer program for my husband and me to show how streamlined and efficient his system was compared to the one we were reviewing for purchase. When choosing a system for our own practice, it was clear that his would not meet our needs in that once the diverse categories of a family practice were included into his vendor's system, the complexity would be just as great with his vendor as with the one we were considering at the time. Our personal choice ended up being Allscripts since it was a nationally recognized company for PCP practices, was endorsed by Obama, and exhibited potential for being interoperable with the local hospital's computer system which also was Allscripts at the time. The point is that this decision-making is very relevant to the process of EHR adoption and must be considered when studying the climate of the medicological environment.

14. This was a tricky designation since many physicians, though considered "independent," may have had some financial association with a hospital. For instance, independent PCPs could still have admitting privileges to hospitals or could be directors of nursing homes or hospital facilities that were associated with a hospital. The key in this selection process was that the physicians made their own decision about EHR

purchases for their own practice. The decision was not forced upon the physicians. This type of independent practice had been referred to as a "dinosaur" in medicine since so many private practices were being forced into large group networks under the direct employment of a hospital. Key here again in determining the scope of this observation was that the physicians were independent in making their own practice decisions, namely to purchase and implement their own EHR system without the direct influence of a hospital employer.

15. All interviews and documentation were based upon the methodology described by Yow (*Recording Oral History: A Guide for the Humanities and Social Sciences,* 2005*)*. In this method, the interview is recorded with oral and written permission by the "narrator." A list of preliminary questions is made, but questions are not necessarily read formally to the narrator since the narrator's disclosures led to naturally emerging, spontaneous questions. Upon transcribing the interview, themes are identified and reported in qualitative research fashion. At any point, the interviewer can contact and reinterview or clarify any aspect of the initial interview.

16. Although each of the narrators in these oral history interviews gave permission to be identified, names of all physicians and office members were changed for the sake of privacy.

17. To distinguish more easily between the father, Wayne; the wife and office manager, Sarah; and the son, John, first names are used. It may also be noted that the author communicated with each on a first-name basis as this was an intimate, oral history experience.

18. Sarah White, personal interview, Windber, PA, February 28, 2009.

19. Wayne White, personal interview, Windber, PA, January 24, 2009.

20. James White, personal interview, Windber, PA, January 24, 2009.

21. "DO" refers to Doctor of Osteopathic Medicine while "MD" refers to Doctor of Allopathic Medicine. Although virtually identical in their conventional method of treating and diagnosing patients, the Osteopathic physicians particularly focus on body mechanics through "manipulation" techniques as part of their emphasis on good health.

22. The term "Hospitalist" was first used in the *New England Journal of Medicine* (Wachter & Goldman, 1996) to refer to physicians whose primary focus is the general medical care of hospitalized patients. Hospitalists do not have office-based practices. They typically spend their time only in the hospital setting. Currently in U.S. hospitals, their use is either required by all admitting physicians (who basically relinquish inpatient care to them), optional (as it is in the Conemaugh Health System and the Windber Hospital where the White's admit), or is not yet accepted. Prior to 1996, this profession did exist in the 1970s and 1980s but it was not labeled as such. By the late 1990s, when the term was officially coined, the number of hospitalists was significant and continues to grow in popularity today. A hospitalist's 'normal' day consists of admitting, managing, discharging, and consulting for hospitalized patients. This also includes going on patient rounds.

23. Christine Harrison, personal interview, Windber, PA, February 28, 2009.

24. A popular word recognition program is "Dragon Medical," which requires the physician to "teach" the computer to recognize his or her voice and medical

terminology. Once the program is adapted for the individual physician's voice and medical terminology, the words can be automatically entered onto the medical record. Wayne White used this approach when he took his computer into the patient room. He felt that this encouraged patients to correct him or add information they had forgotten to say. They could interrupt him *as* he orally recorded their medical history and treatments. Wayne's system at the time of this interview, however, was not yet equipped to place the information automatically in the EHR. Rather, he dictated the information onto Microsoft Word and then scanned the document to be placed on the electronic chart (EHR). Once the group was to acquire the more advanced EHR program, the scanning procedure would be eliminated, and the dictation would go immediately onto the electronic chart. With or without the scanning step, Wayne felt this method facilitated physician/patient communication and improved accuracy of data entry.

25. Several articles discussed this issue of the computer screen in the room. In fact, most of these were quite popular in the research when EHRs became a possibility in patient care. These included, "Effects of Exam-Room Computing on Clinician-Patient Communication: A Longitudinal Qualitative Study" (Frankel et al., 2005); "Electronic Medical Record Use and Physician-Patient Communication: An Observational Study of Israeli Primary Care Encounters" (Marglit, Roter, Dunevant, Larson, & Reis, 2006); and "The Influence of Electronic Medical Record Usage on Nonverbal Communication in the Medical Interview" (McGrath, Arar, & Pugh, 2007). These articles specifically discussed the problems associated with using a computer screen in the room with patients. However, as noted at the end of this study, desktop or laptop computers became less and less common in patient rooms as convertible laptop tablets were becoming the norm. Due to their ability to fold into a flat writing surface, they had the potential of at least minimizing the physical barrier between the physician and the patient, depending upon how effectively the physician managed to look at the patient while typing in notes. When a computer screen was present in the room, the medium itself affected the effectiveness of the message being accurately transmitted.

26. Christine made similar comments about using the computer in the patient rooms. She said, "I tried to take it into the room, but I feel like I am not giving them the attention that they need, and I feel like they feel like that too. . . . Some people say, 'Are you listening to what I am saying?' It is difficult for me to make them feel like I am looking at them while I am looking at the computer. So, I want the patients to feel like I am looking at them. . . . If you are not looking at someone just in general, they don't feel like you are listening to them."

27. Since the time of this study, I had several follow-up conversations with Dr. White. Although currently retired from active practice, he felt strongly that he should not bring the computer screen back into the patients' rooms. This seemed to indicate that he "gave it a try" but did not feel that the use of a computer screen was a fair substitute for face-to-face communication. What was remarkable about this physician was his willingness to try new things and his skill at using the computer despite no formal training even in typing. He had continued to be a model for area physicians with his suggestions for how to adapt to online communication and EHRs.

28. James further explained, “Textbooks are now essentially obsolete. By the time a text comes to print, the newest version of even *Harrison’s Principles of Internal Medicine*, the gold standard, come to print, it is already out modeled by three years.” James felt that the use of electronic materials was more up-to-date; however, “to be an effective healthcare person, you have to be able to use these [Internet and eBooks] as tools but not as a replacement for the human mind because the human mind is still ten times superior to any piece of equipment we will ever have. There is still no computer that can match the ability and the adaptability of the human brain.”

29. For a fascinating case study that captured the elderly views at the time of this interview plus additional articles on the “digital divide,” see “The Elderly and the Internet: A Case Study” (Campbell & Wabby, 2003); “The Return of the House Call: The Role of Internet-Based Interactivity in Bringing Health Information Home to Older Adults” (Macias & McMillan, 2008); “A 67-Year-Old Man Who e-Mails His Physician” (Slack, 2004); and “Seniors Seeking Health Information Need Help Crossing ‘Digital Divide,’” (Voelker, 2005).

30. EMR again refers to electronic medical record. The term was used interchangeably with EHR by the interviewed physicians.

31. Sarah also supported this notion of middle-aged people seeming to be less interested in adapting to technology. She stated, “I have a 101-year-old aunt and she emails. On the other hand, my 40-year-old sister-in-law probably wouldn’t even know how to turn on a computer.” She also mentioned that her mother, also a physician at the age of 63, refused to “touch a computer.” Sarah says that her mom simply said, “I absolutely refuse; I am not doing that.”

32. For related articles on this topic of electronic record-keeping in physician offices, the following may be helpful: “Implementing an Electronic Medical Record in a Family Medicine Practice: Communication, Decision Making, and Conflict” (Crosson, Stroebel, Scott, Stello, & Crabtree, 2005); “Copy-and-Paste” (Hirschtick, 2006); “The Patient-Owned, Population-Based Electronic Medical Record: A Revolutionary Resource for Clinical Medicine” (Rashbass, 2001); and “Electronic Medical Records: A Decade of Experience” (Safran, 2001). Note that these articles reviewed the existing landscape of electronic record-keeping in physician practices. They did not represent all the articles that came out after this interview was done.

33. Sarah mentioned that EHRs were especially needed when their patients went to Florida for the winter. She stated, “The doctors they see down there have no idea what is going on back here. And one thing nice is we are able to fax that information out in an instant.” She foresaw that when EHRs became more global, the speed and efficiency would increase even more. It is likely that Sarah was referring to the interoperability of EHR systems, a primary goal of the electronic records. She realized that once this was the case, the faxing or scanning of information that they did would no longer be necessary. At the time, the Veterans Affairs (VA) hospital systems was interoperable between VA hospitals. It is also possible that Sarah was referring to this. Even that method was much faster than sending something via the postal service.

34. In all fairness to the White practice, they realized that they were amid transition and were going to be making a lot more changes. However, these precautionary

statements are being made from the perspective of research observation bias because in any study such reservations must be noted to show that they are being considered. They are in no way intended to degrade or offend this practice.

35. Nonetheless, the White practice demonstrated a complete transition from paper to electronic charts, something that many practices in transition never quite achieved. My husband's practice, for instance, did not choose to scan all the charts because he did not want to convert those of elderly patients whose charts included two or more binders. At the same time, although the White practice made a complete transition to paperless, it did not and actually could not convert to full digitization of old charts due to the scanning. The move to check boxes and/or fully dictated/typed charts into the system promised to alter not only how the practice members interacted with the charts (as in checking boxes or scanning for particular words) but also how the charts themselves could be used. Digitized bits of information were more easily used for data mining and more readily addressed the challenges of data privacy issues. Likewise, checkbox data entry may also have changed the way the whites interacted with patients, a major departure from their face-to-face interaction with patients. All in all, the White practice impressed me with their pride and commitment toward this medium.

36. See http://www.hrsa.gov/ruralhealth/policy/definition_of_rural.html. This 2014 information comes directly from the HHS website under Health Resources and Services Administration (HRSA).

37. Three excellent books that early on explored these topics in a well-rounded way are *Communicating Health: Personal, Cultural, and Political Complexities* (Geist-Martin, Ray, & Sharf, 2003); *Health Communication in the New Media Landscape* (Parker & Thrson, 2009); *Communication Skills for the Health Care Professional: Concepts, Practice, and Evidence* (Van Servellen, 2009).

38. As stated earlier, one of the leading authors in the field on EHR research since the time of the HITECH Act is Ashish Jha. Although he has been referenced previously, it is important to note that his insights strongly influenced the views that were surfacing and continued to surface within the medicological environment. See "Use of Electronic Health Records in U.S. Hospitals" (Jha et al., 2009).

39. It is to be noted that this practice has changed since 2009 with the eldest for the most part in retirement and additional associates hired. No follow-up analysis was made of this group other than casual conversations with the father/son team who shared with me that they are still "on top" of EHR mandates and moving forward.

40. This research was presented in various forms on numerous occasions: An Arts and Sciences Summer Research Fellowship of the University of Pittsburgh was granted for the summer of 2009. The title was "Maintaining Patient-Centered Care in a Technology-Centered Environment: Exploring the Effects of Electronic Medical Records in Rural Pennsylvania Medicine." It is to be noted that some of these interviews preceded this award in anticipation of this project during the spring of 2009. Additionally, in April 2011, an Agora speakers' series talk at the University of Pittsburgh was presented: "Bridging the Technological Gap: Electronic Medical Records in Rural America Today." This was a formal presentation requirement as a follow-up of the Arts & Sciences Research Fellowship. Finally, in addition to this book, parts

of these interviews were referenced in general in various talks and conferences and at the OHMAR Conference in Washington, DC on April 28, 2010. The title of this presentation was "Physicians in Transition: The Voice of Rural Physicians in Response to Electronic Medical Records."

41. Currently, Deborah owns and operates an independent GYN practice in Ligonier, Pennsylvania. She maintains admitting privileges at Conemaugh Hospital. Although still certified in OB, she currently only sees GYN patients. She uses an EHR system, emails her patients regularly, and maintains an active lecture schedule teaching about women's health and discussing new technological benefits in communicating with patients. This additional information is based upon personal conversations with Deborah over more recent years since the original interview.

42. According to the *Journal of General Internal Medicine* (Stange et al., 2010), the Medical Home is defined as follows: "The patient-centered medical home (PCMH) is four things: (1) the fundamental tenets of primary care: first contact access, comprehensiveness, integration/coordination, and relationships involving sustained partnership; (2) new ways of organizing practice; (3) development of practices' internal capabilities, and (4) related healthcare system and reimbursement changes. All of these are focused on improving the health of whole people, families, communities and populations, and on increasing the value of healthcare. The value of the fundamental tenets of primary care is well established. This value includes higher healthcare quality, better whole-person and population health, lower cost and reduced inequalities compared to healthcare systems not based on primary care." This was a relatively new concept in healthcare at the time, and the fact that Martin decided to apply for this program demonstrated that he was likely a very forward-looking physician.

43. This reminds me of a general communication class that I was teaching in 2009. I was working on this research then and was thinking a lot about online communication with physicians. When I asked my class in general about how many of them used electronic messages with their physicians, only the ones from a larger city said they did, which ended up being about one person per class of twenty-five. The rest of the students chimed in with comments about how great an idea that would be for them. This shows that during this period the people may not have been driving change as much as the technology itself was driving change.

44. Deborah Smith, personal interview, Johnstown, PA, January 22, 2009.

45. Sam Jones, personal interview, Ebensburg, PA, January 12, 2009.

46. Some older physicians tend to use word recognition such as Dragon Medical. My own husband uses this. When listening to his dictations, I cannot help but think I could be typing much faster than he speaks. This is a definite concern for older physicians, at least in my general conversations with them. Wayne White used the dictation system while his younger counterparts did not. They typed directly into the system.

47. Daniel Freedmon, personal interview, Johnstown, PA, January 21, 2009.

48. This was the practice of training Dragon Medical to write automatically a common set of words or even paragraphs by stating a code word like "diabetes." This was demonstrated to my husband by Wayne White when we visited his office on a separate occasion to learn how to use the word recognition equipment more efficiently. Wayne had many codes he would say that would automatically type various

standardized texts onto the electronic chart. This practice is very similar to writing the same thing repeatedly or copy/pasting information. Although this method could potentially save the physician a lot of dictation time, it could easily become a dangerous substitute for individualized documentation in the care of the patient. Granted, some information used was repetitive language, but if this language was used too repetitively, it could be almost forced outside perceptual awareness. The danger was of the reader becoming so used to the common wording that differences would be missed, and patient safety placed at risk.

49. This I can account for firsthand through observations of my husband, daughter, and sister-in-law, who spent a tremendous amount of time each evening after hours catching up on patient data entry from the day before. If EHRs were supposed to be saving time for physicians, then why was this happening to so many? Physicians saying that they were not "keeping up" may have made them appear to be failing the system. After all, medical school constantly promoted speed and efficiency during training. Older physicians who found themselves slowing down considerably due to the new medium may not have been as willing to tell this to many others. My husband was one of these cases. He spent in excess of at least five to seven additional hours each day on charts, and he was always saying he was far from catching up. This was a problem, a time problem; and it was a real issue when using EHRs. If this was the case with many physicians, then how would they have time to respond to electronic messages within EHRs too? Technology was moving very rapidly; but the medium started looking like it just might swallow up the users.

50. Please note that near the time of this publication, the implementation of EHRs was finalized for the Freedmon practice. Many factors were in play with the delayed decision; but Daniel's concern was not interoperability with the local hospital system. Perhaps this was just as well since Conemaugh Health Systems had begun the process of converting from Allscripts to EpicCare, which according to *Medical Economics*'s 2013 data (*Economics*, 2013) was at the time the second largest EHR company in the world with revenues over $1.5 billion. Conemaugh was purchased by Duke LifePoint in late 2014, making the hospital system a for-profit institution. Again, this was an example of how many institutions and physician offices changed their EHR systems, despite the time, cost, and energy involved. Many reasons forced this change, but in the end, the process was all part of the medicological environment—a dynamic one indeed!

51. The cost factors in the conversion process apparently had played a heavy role in the decisions, selections, and applications of EHR systems used in each of these office practices. When adding these to the time spent in training staff members, picking out the "right" system, and adapting to day-to-day office procedural changes, it was easy to see that the costs involved were a significant issue way beyond the price of the system itself. One would think that because of this, physicians would not have made such a change just to have patients communicate online. The money spent in this conversion process was not so much for patient online communication but for record-keeping, interoperable transfer of information, and data analysis. In fact, for some, the motivation was merely because it was mandated by the government through laws. As Daniel stated so bluntly above, spending all this time and effort "for people

to go online and access it" was not going to "improve their quality of life." So there had to be a greater motivation for physicians to spend this money. Whether direct government mandates or mere attraction to technological potential, for an entire country to be committed to this process, there had to be an impetus greater than patients talking online with physicians. The key here was that the medium of EHRs had allowed for online information recording and information exchange. The result was the option of communicating online—something that was almost perceived more as an added benefit (to some) than as a motivation in and of itself.

52. Martin Evans, personal interview, Seward, PA, January 14, 2014.

53. An excellent example of such discovery of disease cures was Sergey Brin's work in uncovering a potential cure for Parkinson's Disease as a result of compiling data from patient questionnaires (Goetz, 2010). This was the sort of thing that the government and/or insurance companies could do with patient data that Sam was so concerned about. Who owned this data, who had the right to examine it, how it could be used, and the like were all concerns about the use of what was in the EHR.

54. Although portals in general were around since the 1990s, they were not incorporated actively into the physician offices until the Stages of Meaningful Use began to outline specific requirements for their applications. As discussed in chapter 2, the impetus for secured portals began for the most part when Stage Two came into action largely in 2014. Therefore, the physicians involved in this set of interviews were not apparently focusing in on the projections for portals as much as they were thinking about getting their charts into electronic form and using computers in their offices.

55. Portions of this survey report were presented in writing and orally as part of a Health Survey Methods class (BCHS 3002) at the University of Pittsburgh. Full IRB approval was granted. Portions of this research was also presented at the National Communication Association (NCA) round table discussion for the Health Communication Division in November 2009 under the title, "Research in Progress on the Transition to Electronic Medical Records in Rural Medicine: A Reception Analysis of How Physician's Perceive Patient Media Literacy." Additionally it was presented in conjunction with the oral history portion at the International Conference on Communication in Healthcare for the American Academy on Communication in Healthcare (ICCH/AACH) Conference in Miami in October 2009 in a paper presentation entitled, "Communicating in a Technical World: Physician-Patient Challenges in Rural America Today."

56. Although this survey was distributed to the physicians associated with Conemaugh Health System, some of these physicians may have simultaneously been members of other health systems including Windber Medical Center, Somerset Hospital, and Indiana Regional Medical Center. Additionally, it is to be noted that at the time of this survey Conemaugh had not yet joined the Duke LifePoint system.

57. A copy of the actual survey is available upon request.

58. Personal data assistants (PDA) is not used very frequently any more since the wide acceptance and usage of the smartphones, which replaced and enhanced existing technology.

59. This technique, though first reported and used in 1954, continues to be a method used in psychology and risk management. In its first application, the method

involved Flanagan's research for the University of Pittsburgh and the American Institute for Research on Airport Terminals in looking at ways to reduce errors in air traffic control. It continues to be used in healthcare when examining safety issues that may be reduced through careful observation and attention to the "incidents" reported by firsthand observers. In Flanagan's early studies, subjects were asked to recall a time when someone did something that represented outstandingly effective in acting as an air traffic controller. The same was done to elicit an example of something that was outstandingly ineffective or a substantially strong deviation from normal. Incidents were gathered, recorded, compared, and evaluated to determine patterns of incidents, including even those that seemed to have unrelated relationships. Flanagan found, for instance, that those who rode motorcycles had the fewest instances of error as air traffic controllers.

60. The total number was deemed adequate for the scope of this study as its purpose was to see if any preliminary relationships or patterns might be achieved through this observational method. Individual classes were chosen by the participating faculty member teaching those courses depending on which were available at the time. Finally, since the two groups were collected from separate teachers, the data collected did remain separated. It is possible, however, that an engineering student could also have been in the psychology class, though this was not noted by anyone and not likely.

61. CIT survey and survey results are available upon request.

62. The CIT technique states that a clearly emphasized statement concerning why it is relevant to study this form of behavior must be made at the onset of the survey.

63. I believed that this specification for students to "imagine" was vital to the success of this study as I anticipated that few, if any, students in the Johnstown region emailed their physicians. This proved to be true; however, asking for students to "imagine" did not fair very well either in the overall collection of incidents as shown in the results. Either due to their age or their personal interest in the study, few students supplied any "imaginative" examples.

64. The question on their residence was assessed because many students who attend Pitt-Johnstown are from urban areas. This information, however, did not end up being very informative since neither group of students really used electronic medical messaging with their physicians.

Chapter 5

The Urban Environment

Implementing the Process

In distinguishing between the rural and urban areas of the medicological environment, this research initially focused on the EHR conversion delay and the lack of online medical communication for rural areas. Capturing physician/patient behavior in action allowed for real-time primary observations of their perceptions. Indeed, there were reasons for this focused choice of study as it provided the perfect sampling ground for research about adoption in process. By contrast, the urban areas not only adopted earlier but had the means to adopt[1] well before mandates were passed down from the government through the HITECH Act of 2009, which forced this conversion from paper to electronic charts and communication. The climate in urban areas was ripe for change as it was *able* to change—well before anything was required. The medicological environment afforded a space in urban areas that was (and is) more amenable to new technologies and technological ways of thinking.

Recognizing the fundamental distinction between rural and urban areas was necessary at this point of analysis because these two populations approached and experienced the interplaying forces of this environment from very different vantage points. The perceptions, attitudes, and behaviors of all those involved were individually and uniquely affected. This distinction in and of itself was a relevant consideration that influenced the conclusions and comparisons drawn regarding rural and urban adoption of EHRs. Both populations were members of the medicological environment, yet each responded to and commingled with the other within the same space in unique yet complementary ways. In studying the urban climate, the rural culture and influence had to be kept actively in mind.[2]

Therefore, before delving into the specific urban studies, this chapter examines several of the more outstanding forces at play within the Johnstown and

Pittsburgh regions in particular. This clarifies why these two regions served as particularly representative, contrasting examples. This also helps frame a more realistic view of the urban research discussed here. Conclusions drawn from a single study are often shortsighted or at best minimally contributory to the sea of knowledge about any body of research. This chapter includes additional information on how these regions compare and contrast with each other and how these studies might suggest research applications for the future.

First, this chapter examines the different yet coexisting forces at play in Pittsburgh and Johnstown from a medicological perspective. Second, it explores the urban facilities more specifically through additional surveys of patient and physician reactions to the use of online communication within an EHR's secured portal, narrowing in on a single, key study involving the UPMC Medical Center's Montefiore Hospital's Internal Medicine program in Pittsburgh, Pennsylvania. Like the previous chapter, this one uses objective surveys of two groups of people who actively used EHRs not only for record-keeping but for online, secured portal physician/patient communication as well. These were both the physicians and the patients who themselves interacted online with each other. The aim of this survey research was to see if these populations perceived EHRs to be effective. Do EHRs' technological capabilities and applications justify the process of conversion? Does online medical communication work in providing an effective means for communicating about health? Or, is the process somehow remiss in its promise of improving healthcare overall? The answers to such questions lie with those who have experienced the process.

In accepting that the observations of this research validate the lived experience of EHR users, it is necessary to take caution in assuming that what happened during this period in the urban, academic environment was necessarily the same experience that rural users had once they had the resources and familiarity with EHR functionality. It must be remembered that the two environments are still different and the potential for different experiences, responses, and applications are not only possible but expected. The best this observational perspective can do is to capture a moment in transition—this time in an urban area. What was exhibited by the urban responders in this research might be very similar to what was later exhibited by rural responders in the relative future. Then again, the two adoption processes were still different because the location, time, situation, and accumulated experiences were different. The outcome remains to be seen as more and more rural practices continue through this transition process.

In order to frame the methodology and results of the urban research studies within this chapter, it is first important to reflect upon a few key distinctions between rural and urban populations, particularly in light of Johnstown and Pittsburgh.

THE MEDICOLOGICAL ENVIRONMENT: THE URBAN AREA THROUGH THE EYES OF RURAL AMERICA

Within any environment, it is always important to identify the existing labels as they may in fact have an effect on how people see themselves, how they interact within the system, how they view the system itself, and how they might affect the behaviors of others. There are many ways of looking not only at the definition of "urban" and "rural" but at the effects that such labels have on the perceptions of those who occupy those spaces. Although far from comprehensive, the examination of three perspectives concerning urban and rural areas helps to clarify these labels and what they mean within the medicological environment. These include census information as well as information on health insurance and broadband access.

The Census Dynamic

To begin with, it is important to identify Johnstown and Pittsburgh as significantly different in population size if they are to be considered representations of the separate categories of rural and urban. That is, were the two populations represented within these studies *different enough* to justify their uniqueness or separateness? The U.S. Census Bureau classifies urban and rural areas based upon geography and population. Urban areas are those densely populated territories that contain residential, commercial, and "other non-residential urban land uses" such as parks and special services. At the time of this data collection, the U.S. Census Bureau identified two types of urban land masses: (1) urbanized areas of 50,000 or more people and (2) urban clusters of at least 2,500 and less than 50,000 people (at least 1,500 of which reside outside of institutional group quarters such as a prison system). All other areas not included in these two groups were considered rural (U.S. Census Bureau, 2010).[3]

Based upon this definition, Pittsburgh, which then had a population of 305,841, and Johnstown, which had a population of only 20,402 (U.S. Census Bureau, 2015), indicate a clear delineation between the two in size as urban and rural respectively. What is more interesting is to see how the two fared in their growth and sustainability, that is, how they maintained their size over time. Pittsburgh approached a 1% growth rate while Johnstown was at –2.7% as of the 2013 reported estimates. That is, the difference in size between the two was expanding. Even more telling is that Johnstown was on record as one of the top seven fastest *shrinking* "cities" in the country with some reporting as of March 2015 that Johnstown was the second fastest shrinking city in the entire country (Frohlich, 2015) with a population growth between 2010 and 2014 of a –4%. Previous to this, CNN Money reported Johnstown as the "7th

Fastest Shrinking City" with a –5.8% change from 2000 to 2010 with a loss of 70% of its population over the past nine decades and about 13% of that within the past thirteen years (Christie, 2013). Certainly, surrounding the time of the HITECH Act of 2009, Johnstown set itself apart as rural compared to the city of Pittsburgh.

Those then living in Johnstown ranged from the elderly members of the community who could recall what the region was like when it held urban status some seventy to eighty years ago to those others who saw Johnstown as a rural region in significant decline in size, job availability, and housing value (U.S. Census Bureau, 2010).[4] Being in a rural area also affected transportation factors that were directly related to travel and shipping costs. Lack of technologies such as broadband services often lead to a depressed financial situation that was more challenging in a smaller area where resources and options were not as prevalent as they were in urban regions. Because of this, the expectations of those in this region were likely not as positive about new technologies due to their significant costs, and this region likely did not have the resources even to think about such advancement. This is an assumption, but it may very well describe the mentality of the average patient and may certainly support why the physicians in the rural survey in chapter 4 had such low expectations of their patients in terms of their technological skills and needs. A depressed environment certainly reflects a very different mindset than a region whose economy is doing well and whose desire for self-actualization might be higher (Koltko-Rivera, 2006).

There is significance in noting this specific characteristic of the Johnstown versus the Pittsburgh regions. The *perceptions* of physicians in the rural area were expected to be different from those of the urban area merely because of the size and benefits of being in a more densely populated region. At the same time, it is important not to assume that the advanced technological state demonstrated in the urban region of Pittsburgh was necessarily achieved quickly or in the same way as it was in the rural region of Johnstown. To keep this in mind is to be realistic about how the systemic changes evolved throughout the medicological environment not just through the influence of the medium but also through the multifaceted influence of regional population growth and change. All working parts affect the relationships and responses within that system.

The Insurance "Coverage Gap"

In chapter 4, it was previously noted that the transition toward managed care (Health Maintenance Organizations, or HMOs) acceptance in healthcare had a cumulative influence on insurance company requirements and governmental impact on the state of affairs at the time of EHR adoption. The *memory* of this adoption likely affected the perceptions of those responding to the existing state of affairs.

By 2014, an additional concern existed: the health insurance "coverage gap." Fears surrounding this gap became exacerbated by new coverage patterns that emerged in response to the Affordable Care Act. When combined with aspects of rural and urban population factors, the gap became a serious concern not only to the physicians within the medicological environment but to the patients as well.

Rural Shortages

To begin with, the "gap" in healthcare treatment affected rural populations much more heavily than urban ones, and, in doing so, a rippling effect yet again was felt throughout these regions. Because of locational factors alone, rural America provided limited access to healthcare. This stemmed from two factors: Many Americans historically were not insured with health coverage and professionals tended to gravitate toward affluent urban and suburban areas. According to Rosenblatt and Hart (2000), a constant physician shortage existed in rural areas of the United States with about 20% of the overall U.S. population and only about 9% of the nation's practicing physicians in rural communities. Additionally, because of this overall shortage, it was difficult for rural areas to attract specialists. Family practice and other such primary care physicians logically set up offices in rural areas at a rate proportionate to the existing population while specialists gravitated toward urban areas because the need for such specialties was greater per capita in dense urban regions. This means that for rural area patients to obtain medical care (especially specialized care), they had to seek it from urban areas. This likewise means that the population composition of "urban" patients was inadvertently overlapped with several rural patients. Any research done on urban populations by default must recognize that rural members could be represented within the population sample.[5] The statistical overlap is not as important as the conceptual one. Stated directly, attitudes, values, perceptions, and behaviors of rural patients must be included in the urban samples. The effect of their influence is immeasurable, yet there, nonetheless.

This overlap, however, does not diminish the fact that rural areas suffered the impact of fewer physicians and, in turn, smaller hospitals, and less up-to-date technological offerings. One impacted the other. Even more so, the effect of managed care *continued* to bear its effect on the rural health system in that HMOs were directly affected by the rural "gap" of insurance and provider availability. Even as late as 2000, many remained concerned that the private managed care systems, which dominated the urban areas through large metropolitan healthcare systems, would be reluctant to provide care to the uninsured. As a result, rural patients were not able to go to available physicians in urban areas because their insurance (or lack thereof) would not be accepted by the urban HMO plan. This existed as an underlying fear of the managed care HMO plans (Rosenblatt & Hart, 2000). The working poor fell into the gap of having neither Medicaid nor regular health insurance. This was the "memory" of the physicians in the late 1990s, and this memory lingered for those who continued to seek health insurance.

The Affordable Care Act "Gap"

The government's answer to the woes of managed care was to be the Affordable Care Act of March 23, 2010. Uninsured or underinsured Americans were to gain healthcare access by going to the government website (health.gov) and applying for coverage. Unfortunately, multiple often unanticipated "gaps" existed for many who sought coverage. For some, this gap was a "short coverage gap exemption," which meant that a person applying for insurance had to go without coverage for less than three consecutive months out of the year (Obamacare Facts, 2015).

For others, the gap referred to a place where low-income people whose annual earnings fell above the qualification for Medicaid eligibility and yet below the lower limit for marketplace premium tax credits ("Obamacare" insurance). Over time, this gap was hoped to be made up for by individual states expanding their programs to include the uninsured. However, this had not happened. According to a Kaiser Family Foundation analysis (Garfield, Stephens, & Rouhani, 2015), roughly four million people across the United States fell into this coverage gap with 89% of these in the South, 7% in the Midwest, 4% in the West, and 1% in the Northeast. This affected rural populations more so than urban ones because the former had different demographics, health needs, and insurance coverage profiles. Specifically, nearly two-thirds of the uninsured rural population inhabited states that had not implemented Medicaid expansion. Of the 47.3 million uninsured people, 7.3 million were from rural areas with 65% of these living in nonexpansion states. Of the forty million uninsured urban patients, only 50% were living in nonexpansion states. This reflects a disproportionate number of rural patients who fell through the gap giving them fewer Affordable Care options than their urban counterparts (Newkirk, 2014). In short, those who lived in rural areas had not only faced transportation barriers forcing them to travel from rural to urban areas, but also reduced provider availability and overall greater coverage gaps than their urban counterparts.

This shows yet another force separating the urban and rural members. This time it was government imposed, and, according to the Kaiser Foundation data, it was imposed in a disproportionately harsher manner against the rural population. Clearly, the response to such discrimination (within a law that was to *reduce* difference) would be found to be even more aggravating in the rural than the urban environment. The desire for more technology, more online communication, and better interoperability seemed to be almost irrelevant since the availability of funds were not there to provide *any* healthcare—let alone technologically savvy care.

The whole argument that urban areas lead the way for their rural counterparts seems almost meaningless if healthcare was financially unattainable for rural residents. Again, this puts any research about urban usage and difference into perspective.

Broadband as an Equalizing Factor

Finally, as stated in previous chapters, the issue of broadband availability also set rural and urban communities apart. If rural users had no ability to access advanced technology, what good did it do for urban areas to provide the technology to those rural patients who traveled to urban areas for their care? This is a valid question—especially considering the research done herein on urban use of EHRs and online medical communication. Once again, the subjects surveyed from the UPMC Montefiore Hospital study were assumedly city residents who utilized the broad spectrum of online services provided by EHRs through the HealthTrak portal. However, it has already been argued that some of the subjects in the study who may have traveled from Johnstown to Pittsburgh for healthcare might very well have been from a rural population, making the digital divide much less divisive between the two population samples. So long as the rural area had reliable and fast-enough Internet capabilities, the difference between the rural and the urban patient using EHR technology within the secured portals may have been negligible. Yet, this was not always the case.

According to the National Telecommunications and Information Administration (NTIA, 2013), when the speed of the broadband service was taken into consideration, the disparities between urban and rural areas increased as the speed increased; and, of course, the speed increased when users lived the closest to high-density populations. Speed affected usage and, in turn, the likelihood of satisfied users of EHR online communication technology. However, according to the NTIA (2013), discrepancies also existed within urban areas as well with suburbs having higher percentages of residents with higher-speed download capabilities than did inner cities, despite population density comparisons. This shows that variability even within the urban areas could cause the results and interpretation of the data to be skewed.

The "Urban" Label

In short, the labels of "urban" and "rural" broadly discriminate between the two groups, enough so that this environment may be studied from each perspective separately. However, as the following research studies on Pittsburgh

EHR users showed, the results must consider that some of the users might physically have been from rural areas, some of the urban population might have been left out simply because they fell under the “coverage gap,” and some of the users even within the urban population may have had varying degrees of Internet speed and/or access.

SURVEYS OF URBAN PHYSICIANS AND PATIENTS

In exploring the medicological environment from the perspective of those who had actively used EHRs and secured online messaging for health information, this segment examines two separate surveys conducted on urban physicians’ and patients’ perceptions of the efficacy of this medium for medical interactions. Using survey research techniques (Aday & Cornelius, 2006; Fowler, 2009), each survey was distributed following Institutional Review Board (IRB) requirements and reported on using statistical analysis appropriate to social science research methodology. This section ends by analyzing this survey data and then comparing it with the other methods used throughout this entire exploratory project. Again, it is important to reiterate that although the mandates affected all urban facilities, this particular facility is an academic one, which means that it already had actively begun using EHRs and online communication between physicians and patients at the time of this research.

Two separate surveys were distributed to past physician and patient users of a secured electronic messaging service provided by their healthcare system. First, the full scope, functionality, and history of the healthcare online system will be reviewed. Information on the population sample, survey content, and survey distribution will follow.

Setting

This study was conducted in cooperation with the University of Pittsburgh Physicians-General Internal Medicine Oakland (UPP-GIMO) clinic of UPMC Montefiore Hospital in Pittsburgh, Pennsylvania.[6] UPMC Montefiore Hospital is part of the UPMC Presbyterian Hospital, which is an adult medical-surgical referral hospital and which contains ongoing research and graduate programs in conjunction with the University of Pittsburgh School of Medicine. UPMC itself acts as the largest employer in Western Pennsylvania and the second largest in the state. At the time, there were over 55,000 employees (including over 3,000 physicians); more than twenty academic, community, and specialty hospitals; 400 outpatient locations, and a nearly

1.6-million-member health plan. Closely affiliated with the University of Pittsburgh Schools of Health Sciences, this nonprofit health system's primary location is adjacent to and includes parts of the campus of the University of Pittsburgh ("The UPMC Story," 2013).

The UPMC HealthTrak System: A Timeline

Unique to UPMC was its "HealthTrak"[7] online messaging and patient health communication system. According to Lisa A. Fao, UPMC's Systems Analyst-Lead, the timeline for implementation of the HealthTrak system began prior to the January 2006 start date of the data relating to this study (personal communication, June 17, 2011). GIMO was the first group that test launched the online communication service on September 30, 2003, with a pilot then called "MyUPMC." A year later, on September 29, 2004, the system was upgraded to "UPMC HealthTrak" but was limited only to those physicians and patients of GIMO. By February 2005, the service was expanded to three additional practices, and by January 2009, many more practices were included. Although cost-associated, virtual visits called "eVisits" were not included in the scope of this study; to understand fully the timeline and changes within the HealthTrak system, it is worth noting that eVisits were first started in a single office on August 19, 2008, and were then expanded to an additional three offices (including GIMO) by April 1, 2009. By September 21, 2010 (the time period immediately after this study), eVisits were rolled out to all primary care offices using the same software package.

GIMO was instrumental in launching UPMC's initial involvement with HealthTrak under the direction of its medical director of Ambulatory Services for the Division of General Internal Medicine in Oakland, Gary S. Fischer, MD. From its first inception as MyUPMC through its eVisit development within HealthTrak, this clinic under Fischer's direction acted as a primary resource for the implementation and development of this physician/patient communication portal. For this reason, the patients and physicians who participated in the GIMO program were chosen for this study. In general, they represented those users with the most long-term experience with the system at the time of data collection.

Again, this information about UPMC HealthTrak and its developers/users was specific to the time of this study. Some changes occurred since then (which are noted in the footnotes throughout this section), but the "moment in time" was the year of the HITECH Act, 2009. The scope was the medicological environment as it existed and functioned in the academic urban setting. EHRs were already in place, and online communication within secured portals between physicians and patients were actively being used.

Overall System and User Description

At the time of this study, UPMC's EHR system was developed and maintained by Epic, a company that provided a wide variety of software packages to mid- and large-sized medical practices, hospitals, and integrated healthcare organizations ("Epic," 2012). "EpicCare"[8] was the ambulatory care software package for patient EHRs, while "MyChart" was the software that allowed patients to access their EHRs online. MyChart, then renamed "HealthTrak" by UPMC, enabled patients to communicate electronically with their physicians' offices through a secured patient portal. This online system allowed patients to access portions of their EHRs by linking them to their medical history or test results, obtain medical advice from their physicians, renew prescriptions, make appointments, ask billing questions, have an online electronic visit (eVisit) with their physicians, and access a wide variety of additional health services ("UPMCHealthTrak," 2012).

For the most part, this service was free of charge to all patients eighteen years of age or older who had Internet access and were comfortable with using this system.[9] All UPP employees of UPMC, including attending physicians and University of Pittsburgh Medical School residents, were registered EpicCare users at the time of this study. Although there were a few non-UPP groups which had contracted with UPMC also to use EpicCare, none of these were involved in the scope of this research. According to Fischer, UPMC later provided EpicCare to affiliate physicians, some of whom had HealthTrak. This, however, was not the case when this study was conducted (personal communication, March 20, 2012).[10]

During this study period, all patients were offered access to this system through a variety of means. Early on, when patients were taken to their rooms to see their physicians, medical assistants handed them a written form to sign up to use the electronic messaging service. At that time, physicians had to enter each of their patients manually into the system. According to Fischer (personal communication, March 20, 2012), at first some physicians may have actively discouraged the use of this system by not advocating patient participation at the time of service. However, by January of 2006, most, if not all, physicians followed the requirements of the UPMC Montefiore GIMO clinic for patients to be afforded full online access to their physicians. Interested patients were encouraged to apply for a HealthTrak user access code, login name, and password at the time of check-in at the clinic. A questionnaire on a tablet computer was generally used throughout the clinic with all incoming new patients. As an added promotion of the service, fliers were posted throughout the physicians' offices and hospital areas to help encourage awareness of HealthTrak. By 2012, HealthTrak was likewise mentioned on the UPMC website.

This process reveals how this environment at that time began to enforce change *from within the system* even before outside forces such as the HITECH Act came into play. It is likely that the organizations which created these standards and updates were anticipating what was ahead based upon their awareness of technology, on what other institutions were starting to embrace, and on their sense of the political climate. In short, change did not simply happen all of a sudden. It was a response to careful observation and planning. Rural areas typically do not react as quickly to trends perhaps because they are not expected to do so. For a Division I research institute like the University of Pittsburgh, which has an overlapping research relationship with UPMC, these anticipatory moves toward electronic health messaging were necessary. The pattern of change within the system already had begun, and the cutting-edge institutions saw this pattern, anticipated its direction, and moved forward with the change.

Navigating HealthTrak: Restrictions and Parameters

By offering a wide variety of quality medical services, the HealthTrak portal encouraged patients to participate in their own health needs through a secure, online navigation system that provided "around-the-clock," cooperative management of their health together with experienced medical professionals.[11]

General Navigation Options

Upon entering the HealthTrak website (https://myupmc.upmc.com/), patients began their use of this portal by watching a demo about how to navigate the system. Users walked through a brief explanation emphasizing convenience, versatility, and ease of use that "is online and on your schedule." Options for using the system were presented on this opening screen allowing patients to request for appointments, track current health issues, renew prescriptions, view medical records, track medications, send a message to the physician, or make a digital house call (eVisit). At the bottom of the front page, the warning, "UPMC HealthTrak is Not for Urgent Medical Health Issues" appeared with a subscript, "If you have an urgent medical problem, call 911 or call your doctor's office."

Those patients who had already been seen at the physician's office and had applied for an access code, username, and password could enter this information at the top of the screen. Once accepted, the next screen took viewers to more specific options that were personalized for patients as to what they "might want" to do. At the center of the screen, links were provided for users to view active, personalized information. These links fell in four categories and appeared as follows:

- Review the preventive care services. We recommend you schedule soon.
- Read your messages. You have 400 new messages.
- View your ten new test results.
- What is an eVisit?

Below this section were additional options that were standard links for all viewers:

- Send a message to your doctor's office
- Request an appointment
- Request present prescription renewal

A variety of other options at the bottom of the page were given to viewers to advance them throughout the system including a special "News for You" segment that provided links to current topics of health information that might have been of interest as well as a link to "UPMC Minute" which was an ongoing video series of conversations with UPMC experts. General links that directed patients to other health information and that were more specific to each patient's needs were included. Finally, on the far-left side of the screen other options were given for reaching many of the same materials. These options were My Medical Record, My Family's Records, eVisits, Appointments, Prescription Renewals, Get Medical Advice, Message Center, Tracking Tools, Health Information, FAQs, Billing & Insurance, Contact & Administrative Information, UPMC.COM, and Find a Doctor. These redirecting choices remained constant on subsequent screens as well.

In general, HealthTrak provided patients with a wide variety of options for involving them in their own health needs. Health education, billing services, appointments, pharmacy needs, and medical advice were all part of this electronic form of communication with patients within the UPMC system. This was the electronic space within which users navigated.

Physician/Patient Interactive Options: Medical Advice Versus eVisits

Two links existed for patients to contact their physicians more directly. As stated in the timeline above, the Medical Advice link was a part of the EpicCare system from its inception. The eVisit link became a newer feature that was first launched in a single office on August 19, 2008, and later in the GIMO clinic in April 2009. Although this study focused specifically on the *Medical Advice* messages, noting the similarities and differences between the two is necessary in understanding the unique nature and function that these two services had within the HealthTrak system.

Medical Advice messaging and eVisits were fundamentally similar in several ways: Both allowed patients to access their physicians directly through the portal and provided the opportunity to write open-ended comments concerning their health needs and concerns. Both required that patients were enrolled in the online service and had first been seen in person by their individual physicians. Both were designed to provide ongoing care for patients outside of the physical office. Neither were meant to be used in the face of an emergency.

Medical Advice messages and eVisits contrasted in at least three interrelated areas: associated fees, intended purpose, and interactive function. To begin with, unlike Medical Advice messaging, eVisits had an associated fee similar to that of a regular office visit.[12] This was because eVisits were considered to be virtual office visits that were intended to involve a thorough review of systems, assessment of the patient, diagnosis of the problem, and suggestion for treatment and/or follow-up. Patients began their eVisit by answering a series of guided, multiple choice or yes/no questions that allowed them to share information necessary for physicians to provide a diagnosis. At the end of the questionnaire, patients could write an open-ended response to explain in more detail any parts of their problem that might have required clarification. The system allowed patients to write in freestyle with up to 5,000 characters per eVisit.[13] Physicians responded to this information directly and "treated" the patients through the Internet by answering them via electronic exchange through the patient portal. The diagnosis and treatment plan was formed in a manner similar to a standard office visit. Prescriptions could be ordered, tests scheduled, referrals made, and follow-up plans implemented.

After this initial "visit," the physician could communicate further with the patient, but this was normally done within the Medical Advice link and not as a separate, paid eVisit. Future scheduled visits only occurred if new health issues or complications arose, requiring follow-up care in person or online. If a patient presented a problem within an eVisit that could not be adequately treated online and it required a face-to-face office visit (or emergency service), there was no fee charged for the initial eVisit. In this case, the patients only paid for the required in-person visits. Any time the problem *could* be adequately addressed online, however, a fee comparable to a standard office visit was charged.

In contrast, the Medical Advice message was a free service to patients and was intended as an opportunity for clarification, explanation, and basic information giving. It was designed as a two-way physician/patient electronic conversation that was not intended to substitute for an office visit. When physicians felt that the Medical Advice venue was inappropriate or inadequate for addressing the patients' needs, they could suggest that their patients make an eVisit or schedule an in-person office visit. Again, only when virtual or face-to-face visits occurred were patients charged.

Medical Advice messages were not intended for diagnosing or resolving *new* health issues but rather for following up after previous visits, for noting changes, for clarification of preexisting problems, for additional explanation of test results (as deemed appropriate by the physician), for reinforcement of treatment plans, and, basically, for any additional interactions that facilitated patients' and physicians' ongoing communication. Although somewhat limited by the nature of the medium itself, these interactions were more free-flowing and open-ended for Medical Advice than for eVisits. The Medical Advice venue allowed the exchange between the physician and the patient to take many different directions and basically followed the flow of the conversation. In contrast, the eVisits followed a prescribed series of "if then" questions and answers that were predesigned and intended for making a specific (new) diagnosis. In this sense, the Medical Advice service more closely resembled the practice of emailing while the eVisit resembled a standard office visit.

This was an important distinction because it reflected what the patients were and were not used to when they entered this space for the first time. In effect, the physician expectations, standard procedures, medical privacy, and so on were not changed. The medium itself changed. By having the new medium of the electronic interactions parallel the old medium of face-to-face visits as closely as possible, the designers of these portals intended that the users would be less fearful of trying to enter and adapt to the new system. The environment necessarily was changed by the medium, but the users had to be guided through that environment with as similar an experience as possible in order that they could adapt as quickly and easily as possible. Without this careful preparation, the patients may have refused to act as participants. Effective change within this environment required nurturing and careful guidance through the nuances of the new medium of EHRs and online communication.

Navigating Features Specific to Medical Advice Messaging

Since this study focused specifically on Medical Advice messages, it is now important to discuss in further detail the process, characteristics, and limitations of physician/patient interaction within this HealthTrak messaging service. The framework within which these messages were transmitted is significant for explaining how this study was designed and how the results are interpreted and applied.

The Patients' View of Medical Advice

When patients entered the "Send Message to Your Doctor" link, a screen appeared that prompted patients to fill in a series of questions. First, patients selected their own physician from a drop-down menu. Then they selected which category of topics best described the purpose of their visit. The following list appeared:

- Nonurgent medical question
- Visit follow-up question
- Prescription question
- Test results question
- Request for referral to a specialist or other service
- Update-no reply needed

These categories served as suggestions for appropriate sorts of messages to be sent to physicians through this link. Once patients made their selections, this category showed up as the subject line in the electronic messages forwarded to the physician's office. This alerted the person receiving the message to the type of message sent even prior to opening it. Again, the subject line was not written by the patient. It was automatically generated by the system when patients chose their desired purpose for their message.

Below the option for message purpose was a textbox that allowed patients to type an open-ended message to the physician. When HealthTrak was initially piloted at MyUPMC in September 2003, there were no restrictions placed on the length of patients' messages. However, from January 2006 until November 2008, during the scope of this study, a 5,000-character limit was put in place. From 2008 on, however, a restriction of 1,000 characters or less was placed on all patient Medical Advice messages. This is relevant since some patients could have sent longer messages for the first twenty-three months of this study. During this period, it was more likely that messages could have included lengthier content such as test results, copy/pasted articles, or forwarded messages. After November 2008 through the end of this study in April 2009, there was no such opportunity for patients to write longer messages within a single message.[14]

At this earlier time, the only way patients could send a lengthier message would be if they sent more than one *consecutive* message through the Medical Advice link. This, though possible, did not appear to be a common practice among HealthTrak users even by the end of this research project. For the most part, patients sent only one message at a time and did so well within the character limit allotted.[15]

Finally, when patients made their initial contact through the Medical Advice link, it appeared as if they were communicating directly to their physicians. Nowhere in the system did it say that the message would be screened or transmitted through anyone other than the physician of choice. Patients had no reason to assume that anyone other than the physicians themselves read and answered the Medical Advice messages. This, however, was not usually the case.

When messages were received in the Medical Advice folder, they were first screened by a health professional such as a registered nurse or medical assistant who reviewed and redirected the message to the appropriate party. If the message appeared to be an emergency, it was immediately responded to with a phone call to the patient. If the patient was not able to be reached, an electronic message was sent directly to the patient telling them to seek emergency care as soon as possible. Follow-up contact attempts were made that were similar to the standard protocol used when emergency messages were left on answering machines. Although the disclaimer that patients should not leave emergency notes appeared on the bottom of the login screen and elsewhere throughout the HealthTrak website, there was still always a possibility that patients would leave such messages.

If the message was not an emergency, the healthcare worker then would determine if it were a true Medical Advice entry that needed to be forwarded to the physician. At times, messages may have been misdirected to Medical Advice when they were intended for other options such as renewing prescriptions or making appointments. In these cases, the healthcare workers redirected the messages to the appropriate party or addressed them themselves. If messages were considered to be true requests for medical advice, they were then forwarded to the requested physician.[16]

These details all affected how well the patient information flowed through the process in an efficient, secure, and effective manner. The system, for it to work effectively, had to be designed in a manner that allowed patients to feel that they were being treated with the same level of professionalism as they would have been in person or on the phone. Again, if people were to adopt such a technological change, the setting needed to be as similar to what the user was accustomed to as possible. The similarity afforded a level of comfort with the new medium, which was different yet presumably similar enough to maintain a level of trust in patients that would encourage their willingness to continue to navigate the system in future interactions as well.

The Physicians′ View of Medical Advice

Within the three years prior to the scope of this study, all employed UPMC outpatient physicians (except those in oncology) were expected to utilize the UPMC HealthTrak secured online access portal for patient communication. This is relevant because it suggests that UPMC Montefiore’s GIMO program physicians were active members of the UPMC HealthTrak system during the time when the electronic messages involved in this study were exchanged and when the surveys were conducted. It is reasonable to assume that since these physicians were part of the original pilot studies, most should have been familiar with the use of electronic messaging within the HealthTrak system.

The experimental nature of this system’s implementation is also significant because it shows that even though this urban facility elected to provide online communication for patients and physicians alike, the users within that system, namely the physicians, were not necessarily willing participants. In this instance, the push was not so much from government mandates (as they were not yet required) but from organizational mandates through the UPMC health system, which strongly nudged physicians to use the technology provided for them. Reluctant or not, physicians were simply told they needed to follow the guidelines established by the organization.

As part of this implementation "push," all GIMO physicians were expected to access their messages each business day and to respond to these within a twenty-four- to forty-eight-hour period (two business days). Since this clinic is a teaching facility, both attending and resident physicians were involved. Typically, the attendings retrieved messages from their inboxes daily, but residents, who may have seen clinic patients only once a week due to their other in-patient hospital responsibilities, may not have accessed their messages every day. To compensate for this, the screening personnel were there to make sure that messages were addressed within the required period. If need be, the screeners paged residents, reminding them of their need to respond to the patients, or, they themselves responded to the messages directly, indicating that a physician response was forthcoming.

From the physician perspective, the gathering of and responding to messages also involved a few key limitations. Although the system was designed for a screener such as a registered nurse to collect, read, redirect, and sometimes answer the messages, this preliminary step could be bypassed if the physician so chose. Some physicians elected to interact directly with their patients without involving the screeners, especially during off hours (evenings, weekends, and vacations). Although physicians had constant access to the general pool of messages, they did not typically retrieve their own messages (personal communication, Fao, April 3, 2012). For the most part, only a few physicians chose direct access on off hours. There was a second case in which physicians and patients could also message back and forth without the screener. This occurred when and if the physician replied to the patient and the patient replied directly back to the physician's email address. This situation was more typical of long-term, ongoing, established dyads of physicians and patients. There was no standard method of automatic forwarding of *new* messages to physicians. In short, direct physician/patient interaction that bypassed the screener only occurred when physicians chose to access messages from the incoming pool of electronic messages or when physicians chose to respond to an ongoing message thread that was exchanged exclusively between the physician and the patient.[17]

No matter what the initial and subsequent message path was (direct to physician or through the screener), all Medical Advice Requests had to be responded to within two business days or within forty-eight hours from the time the message appeared in the inbox. This included the time it might have taken for a screener to intercept and redirect the message to the appropriate party. This assured that patients knew that the messages were received and that care could be provided in a timely manner. This also assured that emergencies did not fall outside of someone's awareness if in fact a patient did inappropriately place a message with such content into the Medical Advice folder.

Of course, it is always possible that a message was not responded to within the forty-eight-hour time period. This would have been in violation of quality care standards. If someone suffered an ill consequence from such a delay, the hospital and personnel could have been held liable for this just as with a delayed telephone reply. The healthcare system must uphold standards of care no matter what medium is used.[18]

Transaction Features of Medical Advice

From a legal standpoint, this GIMO example shows that physicians and all who responded to patient messages (no matter what system was used) were expected to do so directly from their own screen name and not through another person's screen name. It would be unethical for a physician to allow a nurse to respond to an electronic message from a patient in a manner that suggested it was coming from the physician directly. Although this misrepresentation is always possible for anyone who uses electronic messaging, it was strongly discouraged in this setting since all users had to be healthcare employees who themselves had their own email address from which to respond. However, if for any reason a physician did respond by using another person's user name, this was to be clearly noted in the message itself. This is a quality assurance issue which facilitates patient privacy and upholds HIPAA regulations.[19]

The medium itself affects the transmission of the message and in so doing maintains patient confidentiality, privacy, and communication awareness. On a phone conversation, the voice of the speaker often helps identify the sender (even beyond self-naming). On email, physical nonverbal identifiers are not present. Receivers would have to depend upon signatures or stylistic writing properties that may or may not be indicative of the senders themselves. For these reasons, senders of electronic messages must respond from their own address and in a manner that indicates their authentic professional standing.

This identification responsibility is not only implied by the HIPAA regulations of 1996 but also by subsequent regulations specified by the Patient Safety and Quality Improvement Act (PSQIA) of 2005, which was published in the Federal Register on November 21, 2008, and made effective in January 2009 (Department of Health and Human Services, 2008).[20] Healthcare workers must protect themselves, the patients, and each other by appropriately identifying the actual source of the message. Unfortunately, such specific implications are not regularly discussed or outlined by those implementing these online services largely perhaps because it may be automatically assumed that people identify themselves when they write a message.[21] Whatever the case, they are bound by HIPAA regulations.

The same holds true for patients who use caretakers, patient representatives, family members, or other designated surrogates to write for them in an electronic message. Users must gain signed permission by the patient, and this signature must be documented in the medical records in the same manner as any designated patient representative. Although HIPAA laws do not specifically state that users must clearly and honestly represent themselves, the same standards must apply for the accurate and safe exchange of information by the patient, patient representative, or healthcare worker. All parties must identify themselves clearly and must do so with the authority given to them by the email address owner (patients and healthcare professionals alike). This is a code of ethics that needs to be understood and upheld with any email exchange, especially when it concerns the life and well-being of a patient.

In the case of HealthTrak, there was a built-in sign-up feature in Medical Advice in which patients could act in proxy for those from infancy to seventeen years of age and for those adults who did not feel capable of communicating on their own behalf for any reason. Since GIMO was an internal medicine clinic, patients under the age of eighteen were not typical; however, adult patients caring for their elderly family members and friends may have been much more common. Because of this, the option for emailing in proxy existed with prior authorization. In this instance, information access included the ability to make appointments, view all available medical information, and communicate online on behalf of the patient with the physician and or physician's office staff. This registered proxy access had to be made known in writing to the physician prior to electronic message exchange and made obvious to all those communicating within the system. Again, as with all who communicate online, especially in the highly confidential area of personal health information, *accurate representation of both parties during communication is assumed* during all aspects of the interactions.

Several additional assumptions should be noted at the onset concerning general characteristics of electronic messages:

- Not every message is responded to by electronic message. Some messages may be answered in person, at the next visit, or by phone. Some may be erroneously overlooked or missed (but this is certainly not a recommended behavior when dealing with healthcare issues). Others may appear to be merely informative and not to require a response (such as a report of blood sugars or a list of medications that were forgotten at the last in-person visit).

- Sometimes more than one message is sent before a response is received, that is, a series of one-way messages are delivered before any response is made by the receiver.
- Sometimes one message is copied or even blind copied to more than one receiver. This message may in turn be responded to by multiple parties.
- Some messages contain a history of previous message streams attached at the end of the electronic message.
- Some reflect forwarded messages from others, and some contain copy/pasted materials.

These electronic communication assumptions are central to the design, implementation, and interpretation stages of this entire study. The medium affects the transmission process, the interpretation (meaning) of the way in which the messages are sent, and even the expectations surrounding the message.

Finally, the issue of interfacing with other systems and multiple venues for access must be mentioned. In the case of GIMO, all those who used UPMC HealthTrak had access to the entire system and only that system, which was bound by all privacy and HIPAA regulatory laws. At the time of this study, UPMC was not involved with issues of interfacing with broader, external networks such as affiliated hospitals or health systems. Thus, interoperability between and among outside systems was beyond the scope of this study. Physician/patient perceptions were therefore based upon the use of interactions solely exchanged within the parameters of the HealthTrak safe portal.

Population

All UPMC GIMO physician and patient users of the Medical Advice portion of HealthTrak between January 1, 2006, and April 19, 2010, were considered as potential participants in this study. Those patients and physicians who became first-time users after April of 2010 were not considered eligible. All users at the time of this study were aged 18 or older. Those enrolled as legal proxies for patients who were under the age of 18 or who were in need of communication assistance were also included in this sample, but no distinctions were made between proxies and patient users.[22] Since GIMO was an internal medicine clinic mostly treating adult patients, few, if any, proxies represented those under the age of 18. All users were registered HealthTrak participants with their own identification number, usernames, and passwords. No connection was made between these identifiers, names, or private health information (PHI) of individual patients. This was in compliance with HIPAA regulations, University of Pittsburgh IRB, Center for the Assistance in Research (CARE), and the Quality Improvement Department of UPMC.

No matching of participants with their own messages was possible, thus assuring adherence to confidentiality mandates.

Patient Population

This survey research took place in conjunction with an ongoing content analysis of messages sent within the UPMC portal from January 2006 to April 2010 (discussed in chapter 6), with the surveys discussed here being distributed from December 2010 through January 2011.[23]

To determine the number of eligible patients used in the survey, several factors were considered. To begin with, 24,487 patients were identified as being both (1) seen in the GIMO clinic and (2) registered in the HealthTrak system. Each logged in to the secured portal at least one time between January 1, 2006, and April 19, 2010. This number of online patient participants represents only a percentage of the entire patient population seen through GIMO during this period (since all patients had to be seen first in a face-to-face visit before they could register as an online, HealthTrak user).

Although 24,487 patients had logged into the system during this time, not all of these were eligible or able to take the online survey. First, those patients identified as expired were subtracted from the total eligible respondents. Second, all patients who utilized GIMO for specialized purposes considered outside of the scope of internal medicine were eliminated: namely prenatal, postpartum, and Pittsburgh AIDS Center for Treatment (PACT) visits were eliminated from the total.[24] Only those who went to GIMO for office visits, consults, procedure visits, new patient visits, mental health evaluations, preconception consults, and palliative care visits were included. Third, since this study is about online physician/patient medical conversation, those patients who entered the system using services other than Medical Advice, were also eliminated. That is, if patients used the online portal for scheduling appointments, filling prescriptions, and checking on financial responsibilities but not Medical Advice, they were not included in the total number of eligible survey participants (N).

After omitting the ineligible subjects, the total number of surveys sent out to the patients was 3,212, representing only 13% of the total number of HealthTrak users.[25] Again, for the purpose of this survey, only those who were active in the system could be included in the total population of users.[26]

Physician Population

A total of seventy-three physicians were involved in this survey study with forty being listed as internal medicine practicing physicians employed by UPMC and thirty-three as resident physicians who rotated off and on throughout various departments of the healthcare system. As temporary physicians, these residents for the most part were not likely participants in the communication that occurred with patients during January 2006 through April 2010 since it was in advance of the period that they were working at GIMO. One physician, however, was a resident when the messages were exchanged and then became a practicing physician at the time the surveys were distributed. This physician was included in the total of forty practicing physicians since he/she was an active user of the HealthTrak system at the time of the survey distribution. Any other physicians who may have been added to the medical staff after the time of the message exchanges were not distinguished in this study. It is assumed, however, that even if the practicing physicians did not communicate online with the participating patients between 2006 and 2010, they still had ample experience in using the system since their position required this form of active communication. Therefore, practicing physicians (but not resident physicians) at the time of this study were the only ones included in the forty who took this survey. Finally, twelve additional physicians participated in the actual online Medical Advice messages (making a total of fifty-two physician users). These, however, were no longer active members of the GIMO medical staff at the time of this study so were not available (nor identifiable) for inclusion in this survey.

Additionally, since the thirty-three residents were readily available for input, they did participate in the *preliminary* test survey as discussed below. Their responses, again, were not included in the actual data results of this study but were only used for input on the preliminary survey design.

Survey Development and Distribution

Both the patient and physician surveys were similar in basic content, design, and distribution. Parallel questions were created to compare and contrast each group's perception of efficacy of online health communication through the Medical Advice link. Each survey was designed and sent out anonymously through SurveyMonkey. Although some differences existed in how research approval was obtained, how questions were phrased, and what format was used (such as open-ended questions vs. close-ended questions), the two surveys for the most part closely paralleled each other.

All surveys were distributed within a one-month period with first and second reminders occurring in intervals of about two weeks. Patients received the initial survey request on December 14, 2010, followed by the first reminder on December 29 and second reminder on January 12, 2011. Physicians received the initial survey on December 22, followed by the first reminder on January 6 and second reminder on January 20. Prior to each distribution of surveys to physicians, a personal request was additionally made at a faculty staff meeting which averaged a faculty attendance of about 24/40 or 60%. Each survey distributed requested a one-week response. The response period for all surveys was within seven weeks, running until the end of the second full month (January 31, 2011).

Patient Survey: Design, Approval, Distribution

Several key areas of difference set this survey apart from the physician survey. Here follows a detailed summary of these small yet important distinctions and of the overall procedure followed in implementing this survey.

Patient Survey Design

In designing the patient survey, it was necessary to assess both media usage *patterns* and *perceptions*. Fundamentally, the survey was designed to determine how effective patients deemed the Medical Advice link within the HealthTrak portal to be for communicating with their healthcare professionals. Because of this, the definitive question was, "Is electronic messaging between physicians and patients an effective overall means for conducting healthcare?" It was hoped that comparing the response from this question to all other responses would yield related information about this medium's effectiveness.

More specifically, additional questions included how frequently patients sent electronic messages to their physicians; how easy the process was; how helpful it was in improving their overall health; how promptly the physicians responded; how often their messages led to follow-up, face-to-face visits; how useful the medium was for specific health needs (such as emergencies or relational issues); and what types of communication mediums patients felt were most effective in acquiring information about health (including face-to-face, television, radio, journals, websites, etc.). Since it is possible that patients who use a wide variety of media forms on a regular basis may perceive electronic messaging (particularly within the Medical Advice link) more favorably, this study hoped to determine if any additional information and associations might shed light on this medium's effectiveness.

Each question was guided by the SurveyMonkey program design which required that all questions be answered before the next one could be viewed. Data from surveys that were not completed was not recorded. It is not known how many or even if any surveys were partially completed and/or discontinued. All patients could only take the survey once since a single link was provided in the solicitation letter. The link would not reopen if the survey was already completed. These parameters were preset by the SurveyMonkey program.

All questions were closed-ended with most following a six-point Likert scale. This design was intended to force respondents to lean in one or the other direction and not opt out as “neutral” or noncommittal. Likewise, the key question concerning perception of efficacy (#15) was yes/no in format, requiring all subjects to commit to one or the other position.

Open-ended questions were considered in the original design of the survey; however, it could not be guaranteed that patients would leave out all identifiers such as the names of patients, relatives, care takers, or even physicians in their responses. Even though a warning not to include names, places, dates, or other identifying information in the responses could have been made, there was no way of assuring that patients would understand the seriousness of such disclosures or even realize that they might have provided something that could have identified themselves or others involved in their care. Certainly, a request for specific examples of how well the medium worked or did not work in providing effective communication about health could have led to a wealth of information; however, the security and anonymity of all those involved had to be maintained. Therefore, only close-ended responses were allowed, and no space was provided for open-ended remarks.

Patient Survey Approval

As for the approval to do this portion of the research, it is important to note that it did not come through the University IRB but rather through the UPMC Health System as a “Quality Improvement (QI) Project.” As required through the Center for Assistance in Research using eRecords (CARe), this study had to meet the regulatory requirements for accessing or extracting data from UPMC EHRs. Since this project was approved by the QI committee process rather than the IRB, it met all necessary CARe standards for approval.[27]

The project itself was titled “Patient Satisfaction with UPMC HealthTrak in General Internal Medicine” and was sponsored and monitored by Fischer, the medical director of the outpatient general internal medicine clinic at Montefiore University Hospital (MUH; a UPMC entity). Fischer was in a position that allowed him to make changes based upon the outcome of this study. The main reason QI agreed to this study, however, was to seek information on the effectiveness of their physicians’ electronic communication with patients.

In the application for QI approval, the goals of this study were listed as follows:

- To determine patients’ view of HealthTrak in terms of its usefulness as a means of communication with the MUH office.
- To determine how patients’ view HealthTrak compared to other methods of communication for different situations.

- To determine if the MUH office (physicians and staff) are satisfying patients in terms of MUH's responsiveness and answers to questions.
- To determine if patients consider electronic messaging within HealthTrak as beneficial to their overall health.

This focus on the effectiveness of the HealthTrak program itself also came with the commitment to implement a corrective plan if deemed necessary at the conclusion of this study. That is to say that if deficiencies were uncovered throughout this research, this improvement project agreed

- To create an action plan to correct them.
- To instruct users on what situations (if any) they should encourage HealthTrak use and in what situations they should encourage other forms of communication.
- To determine how much additional time, effort, and resources should be devoted to promoting this form of communication in the future (especially if it is not determined to be effective as perceived by the patients).

In short, this portion of the project went through the QI division because it was designed more to maintain effective physician/staff/patient relationships than solely to create publishable research. That is, key outcomes evaluated were patient satisfaction and perceived efficacy. Patients were not subjected to any intervention or treatments. It was hoped that information obtained would not only lead to a better understanding of online communication from the patient's point of view, but would also lead to a determination of how best to promote the various uses of HealthTrak to the patients and to uncover deficiencies in usage that could lead to remediation and overall improvement of this service.

Since patient data collection was involved through EHR review of demographic information and email addresses of GIMO HealthTrak users to be surveyed, all patient identifiable data that was collected and stored for this study complied with the UPMC Policy HS MR1000 regarding the privacy and security of related clinical data.

Patient Survey Distribution

A series of three requests were sent to the original group of 3,212 patients. The first stated that the patient was identified as being a UPMC HealthTrak user, that the survey's intention was to seek information from them in order to improve patient service, that the survey would not take more than fifteen minutes to complete, and that a response was requested within two days. Additionally, the patients were assured of their anonymity with the explanation that there was no way their name or email address could be linked or shared with anyone else. Patients were asked to click on the SurveyMonkey link or to copy/paste it into their web browser. The letter was signed by Fischer with the direction that if there were any questions the patient could contact him through the HealthTrak system with "To Dr. Fischer" and the reason for the message. A phone number was also provided for direct contact with Fischer. First and second reminder letters were sent to improve patient response.[28]

Physician Survey: Design, Approval, Distribution

As stated earlier, the basic design and distribution of the physician and patient surveys were similar; however, a few notable differences must be mentioned.

Physician Survey Design

This survey was developed to see whether the physicians felt that the use of electronic messages with patients through the Medical Advice link provided an effective tool for communication about health. As stated above, since all forty physicians within the GIMO group were required to use this medium with any patient who elected to do so, they were considered to be an experienced, available sample. However, since the thirty-three rotating residents had less consistent contact, those who were present prior to the final survey distribution were used to pilot the questionnaire.

The request for participation in this pilot was sent to about ten available residents who were working at the clinic at the time. A formal email letter sent by Fischer, with whom all GIMO residents were familiar, stated that a doctoral student in communication was conducting a survey with the GIMO physicians to acquire information about their use and perceptions of HealthTrak messaging.[29]

Some residents did comment about the survey design in email form directly back to Fischer. One respondent noted that the survey took only about nine minutes to complete, which was within the expected ten-minute estimated time frame. Another noted that perhaps the survey should include a question concerning how long the physician user had been utilizing electronic records. This question was considered and added in various forms in the final version of the survey (see below). Finally, a specific question about the purpose of using a six-point Likert scale was asked. Fischer responded back through email, "The 6-point scale was thought to provide more valid psychometric data." All other comments were considered in shaping the final survey questions, including "I would recommend in question #9 please state to whom the question is directed; cost effectiveness for the patient or the physician?" and "I wanted to rank in decreasing order the effectiveness; most effective for the physician is face to face, 2^{nd} electronic and third telephone. I do understand this is the limit of survey monkey."[30] Other than these few comments no additional suggestions were obtained, implying that the pilot posed no serious problem and the questions only needed slight revision for clarification.

This led to the final survey design which ended up being a little longer than the patient one since open-ended questions were added. The reason this option was possible was because (1) an IRB was obtained prior to survey distribution (as discussed below) and (2) physicians were considered to be trained extensively in following patient privacy standards as outlined by HIPAA and hospital security regulations.

The closed-ended questions were quite similar to the patient ones already described above with the definitive question also being, "Is electronic messaging between physicians and patients an effective overall means for conducting healthcare?" Again, a yes or no response was requested. Other questions were altered or added to elicit more information from the physicians' perspective about how this medium was used. Question number 2 asked, "How often do you initiate electronic messaging with your patients for any reason?" This was designed to see if physicians viewed themselves as both respondents *and* initiators of patient interaction. Question 4 inquired about how often physicians encouraged their patients to use Medical Advice to see if these physicians were more likely to look favorably upon this medium's overall effectiveness than those who did not encourage usage. Question 5, though similar to question 4 on the patient survey about response time, was asked to see if physician perceptions of response time were equal to patient perceptions. That is, did patients think that physicians took longer to answer than the physicians reported or vice versa? These sorts of comparisons were made for many of the questions in an attempt to determine if the patients viewed time, quality, and overall experience the same way as the physicians did. It was assumed that if there was a difference in their perceptions, this might indicate a need for greater patient instruction or a least additional education for both the patient and physician in determining how to narrow this gap.

One set of questions inquired about the effectiveness of various reasons for using electronic messaging. For the patients, these questions (#6) were grouped all together but for the physicians they were subdivided into two categories of questions (#7 and #8), adding the label of "psychosocial reasons" for this group of questions. It was determined that this term may not be familiar to all patients, but physicians may pay special attention to this area, and this might encourage more of a thoughtful approach to this category of questions.

Question 12 was also added for physicians. It addressed the one resident's concern for the length of time physicians have been using an electronic medium. It stated, “Over time, as you have continued to use electronic messaging with your patients, how effective do you feel this form of communication has become?” This “time” element seemed more relevant to physician usage than to patient usage since the latter likely communicated within fewer physician/patient dyads than did physicians. Additional “time” factored questions were also added including, “How many years has it been since you graduated from medical school?” and “How many years have you been using electronic messages to communicate with your patients?” Again, all these questions were in thoughtful response to the comments made during the pilot study.

The remainder of the closed-ended questions asked physicians how they thought patients used electronic means for communicating. These included, “How likely do you think it is for your patients to seek healthcare information by using each of the following resources?” and “As a physician how likely are you to seek medical information from the following sources?” Again, this was added to help determine if there were any significant differences in how patients and physicians viewed both the medium and each other.

Finally, three open-ended questions were included. The first two (#21 and #22) requested one sentence stating the weaknesses of the system and one sentence stating the strengths of the system. The final question (#23) was designed to evoke physician memory of a “critical incident”[31] that occurred in the past that may have affected his or her overall responses in this survey. It stated, “Is there any one case that stands out in your mind in using electronic messaging with your patients?” For security purposes, the following sentence was added as a reminder of confidentiality: “Please describe but do not include your name or the name of any other person in your response.” There was no designated limit to the number of characters that the physician could respond to these three open-ended questions.

All data from this open-ended section on the survey was examined for emerging themes which may provide qualitative information and suggest future research directions.

Physician Survey Approval

There were two reasons as to why this study sought approval through the IRB of the University of Pittsburgh (currently OSIRIS) and not just through the QI program: First, its purpose was to do research and not just improve the quality of the HealthTrak online system. Second, it involved open-ended questions by physicians which increased the possibility of PHI disclosure (though this remained quite unlikely). An application for exempt status was submitted and approved.

Specific notations concerning this exempt approval need to be mentioned: First of all, application for the IRB was made with Fischer as the primary investigator with me named as the secondary investigator. The reason for this was because of Fischer's unique status as director of the outpatient GIMO clinic and his associated access to the medical staff and residents. Second, the study was titled "Physician/Patient Electronic Messaging: Physician Survey" and listed as soliciting no information from subjects under the age of 18, no recorded identifiers, and no "sensitive information."

The approval met the requirements of being a part of a larger set of studies which examined physician/patient usage patterns and perceptions of electronic messaging effectiveness/satisfaction within a secure patient portal of UPMC HealthTrak. This further research approval was needed because previous UPMC studies were only exploratory in nature, were intended only for program development and assessment purposes, and used measurements that only examined satisfaction of patients but not physician response. It was explained that efficacy and satisfaction appeared to be similar but may not equally measure perception of patient outcome using the electronic messaging system.

As electronic messaging becomes more and more common nationwide, it is important to better understand how physicians perceive the advantages and disadvantages, as well as the situations in which it seems more or less effective. Perceptions on the part of physicians help determine how the implementation of EHRs and online communication enter and are received by the medicological environment. Perceptions affect behavior and how people interpret others' behavior. They provide tremendous insight into how the dynamic force of change progresses and develops throughout this space. How well people adapt to the implementation of online medical communication is affected by these perceptions, which is why they need to be examined from the physician (as well as the patient) perspective.

Based upon this information and criteria, the study was officially approved for exempt status, allowing the surveys to be distributed as planned.

Physician Survey Distribution

As earlier discussed, the process for distributing both the physician and patient surveys was very similar. The only exceptions were that a preliminary letter was sent to the residents for pilot testing and that a personal request was made by Fischer at the regular faculty staff meetings prior to survey distribution. Another minor difference was the size of the physician letter which was nearly half the length of the patient letter. This was done purposefully assuming that physicians (1) were used to receiving such requests for information and (2) would not read a lengthy note due to professional time restraints.[32]

Summary of Survey Methodology

Forty physicians and 3,212 patient users of the Medical Advice link within the UPMC HealthTrak secured portal were each sent an anonymous survey that contained a SurveyMonkey link to a series of questions. This survey was distributed over a three-month period and was collected and analyzed to determine how efficacious each user felt the medium was for communication about health. Analysis of the acquired data using SPSS and basic statistical testing follows.

Overview of Survey Results

Results of this set of surveys provided specific information on the response rates of each group, demographics of patient and physician populations, quantitative analysis of each question and group of related questions for both patients and physicians, qualitative summaries of physician surveys, media usage analyses concerning the medium itself, and perceived medium efficacy on the part of both patients and physicians.

Specific Patient Population and Response Rate

As stated earlier, of the 24,487 patients who had had at least one medical encounter with UPMC Montefiore Hospital's GIMO clinic within the four-year period of January 1, 2006, and April 19, 2010, only 3,212 or 13% of the total patient population utilized the Medical Advice request electronic messaging service at least once through UPMC HealthTrak.

A total of 3,212 surveys were distributed to all eligible HealthTrak users. There were 174 emails returned as undeliverable and 27 patients identified as deceased since the time of the study period (2006–2010). To determine eligible respondents, only the patients with undeliverable addresses were subtracted from the total since there was no way of knowing how many of the deceased patients might have been included among the undeliverable email addresses. The total number of eligible patients was therefore 3,038. Of this total, 910 patients who made Medical Advice Requests through HealthTrak completed the survey resulting in an overall 29% response rate. More specifically, within three days of the distribution of the first survey request, 556/910 or 61% of the total respondents completed the survey. Three days after the first reminder, 23% additional subjects responded (722/910), and three days after the second reminder, 14% (897/910) additionally responded. Although extending the length of the response period may have increased the overall response rate, only 2% (13 subjects) more responded during the last two weeks that the survey remained open. Therefore, it may be assumed that extending the length of the survey response period would not have significantly increased the response rate.

Patient Demographics

Considering respondents' demographic characteristics, nearly 93% of the population was aged 30 or higher, including 27% aged 30–49, 43.4% aged 50–64, and 22.4% over 65. Since pediatrics was not included in this population, it is to be expected that the overall age range is higher within this internal medicine practice. Nevertheless, this does lie in contrast with the predominant assumption that a younger population of patients dominates electronic communication with physicians. Likewise, gender differences were found with a 71% female and 29% male population. This may also reflect the larger overall female population within this age range. Likewise, it was found that high-speed Internet or broadband was used by over 96% of this population with under 4% either using dial-up or not knowing for sure what connection form they have. Realizing that GIMO largely serves an academic and urban community, this may not be surprising, but the fact that this older population of users interacted online at high speed suggests a reasonably savvy user population.

Perception of Efficacy of Electronic Messages for Patients

To identify which questions predicted the criterion variable of efficacy identified in question 15 ("Overall, is electronic messaging between physicians and patients an effective overall means for conducting healthcare?"), multiple regressions were run on all fourteen questions and collapsed subquestions. Using a standardized regression, results showed that six independent variables were identified in stepwise progression from highest to lowest predictability of efficacy (Beta scores in parentheses): Q8 (.374), Q4 (.173), Q2 (.156), Q6, sub-questions 1–9 mean (.140), Q 14.2 (.118), and Q5 (.098).

The coefficient of determination (R^2) was then computed to determine how close the data were to the fitted regression line for multiple regressions. After conducting a regression analysis using the transformed variables, the transformed R^2 was found to be greater than the raw score R^2. Residual plots were also run.

The transformed results identified eight independent variables in stepwise progression from highest to lowest predictability of efficacy (Beta scores in parentheses): Q8 (.287), Q4 (.140), Q2 (.128), Q5 (.127), Q14.2 (.118), Q7 (.113), Q6, sub-questions 1–9 mean (.107), and Q6, sub-questions 10–13 mean (.071). The first six question sets were found to be significant beyond the 0.01 level of significance with only Q6, 1–9 mean, and Q6, 10–13 mean, significant beyond the 0.05 level of significance. Since an even number of choices were given for most questions, the patients responding were forced to lean toward either favorable or not favorable. That is, they could not simply remain neutral or undecided. A Likert scale made it possible to measure the degree of favorability, but it was not calculated for each question, as the main purpose at the time of the study was to find out whether or not the electronic messaging within physician/patient dyads were considered to be working (efficaciousness).

Specifically, results showed that patients who considered electronic communication with their physicians as an overall effective means for conducting healthcare also considered this method of communication highly important to them in reference to their own health needs (Q8). With a Beta score of 0.287 and a significance level beyond 0.0001, this was by far the most outstanding of all the predictor variables. If patients believed that online communication with their physician was important, they also tended to see it as something that worked. "Importance" seemed to reinforce patients' expectations of effective online communication in the physician/patient dyad.[33]

Additional results showed that how promptly physicians responded to their patients' online messages (Q4) was associated with whether the patients thought the medium worked. Q4 was listed as the second most significant predictor variable. "Promptly" referred to responses that were received within the guaranteed forty-eight-hour period. The question categories included as "prompt" were from the last three category options of "Received a response within two days," "Received a response within 24 hours," and "Received a response almost immediately." This shows that patients favored the use of electronic messages the most when they were responded to within the promised time period. It also suggests that the forty-eight-hour period may be considered an appropriate wait period for a physician response online.

The third best predictor, Q3, asked how easy it was to send electronic messages to physicians using HealthTrak. This question not only evaluated the medium of electronic messages but also the individual system of HealthTrak. Results also revealed that "ease of use" may affect patients' perception of efficacy. Basically, if the method of communicating within HealthTrak was easy to navigate and it gave no real problems, then it would be considered to be working.

The fourth best predictor was Q5, which asked patients to state how often their health concerns were resolved through the electronic message exchange without them having to come in to see the physician for another face-to-face (F2F) visit. This suggested that electronic messages were considered working when they reduced the chance for patients to have to come back in to see the physician. Since this only involved medical advice and not eVisits, this showed that patients considered efficacy based upon reduction of return visits. This is a very interesting finding in that patients were shown to view the online visit as something that took the place of them having to come in to see the physician. The issue was dealt with online and without a separate charge. This prevented unnecessary billing for the patients and unnecessary costs upon the health system at large. The fact that these results (Beta = .127) were beyond the 0.0001 significance level supports the idea that online EHR communication might help reduce health costs in the long run—a possible positive from the insurance company and government standpoint.

The fifth highest predictor was Q14.2, which asked, "How likely are you to obtain healthcare information by using each of the following resources?" The sub-question item selected most often was "electronic messaging with physicians." Likewise, this sub-point is the only predictor in the nine-part question. That is, those who are likely to obtain healthcare information via electronic messaging also tend to think it is effective. What is more interesting is what is *not* being said here. That is, those who think electronic messaging works do not also significantly rank the other sub-points as "likely." These include "face-to-face communication" with the physician, family, and friends as well as "reading print media," "watching television," "listening to the radio," "reading blogs on the Internet," and "using Google, WebMD, or other search engines." Electronic messaging, of course, is the focus of this survey, which may influence the patients' tendency to rank electronic messaging as more likely to be used. Nevertheless, for electronic messages to be ranked significantly more "likely" to be used reveals that likelihood of usage and perception of efficacy do have a strong correlation.

While Q14 tested for likeliness of communicating using various resources, Q7 involved only physician communication. It asked patients to list which type of communication ("face-to-face," "telephone conversation," "telephone voice message," or "electronic message") with physicians was most effective for the following interaction characteristics: "convenience," "efficient use of physician time," "efficient use of patient time," "confidentiality," "value for money," "satisfaction," "resolution of health problems," "informative and educational nature of interaction," and "establishing a relationship with the physician." It was found that "electronic message" was listed the most frequently for each of the characteristics (collapsed) at the significance level of > .0001 (Beta = .113). These patients ranked electronic messaging with physicians as more effective than even face-to-face exchanges. This in and of itself is significant in that it suggests that not only do electronic messages work, but they also are perceived as working more effectively than any other forms of communication—including face-to-face.

The remaining two predictor variables within Q6 were found to be at the >.05 significance level. Patients were asked to rate the effectiveness of using electronic messages considering thirteen different circumstances or "reasons."

If patients never used electronic messages in any situation, they were asked to answer the question considering how effective they "think" the situation might be when using electronic messages. For measurement purposes, Q6 was subdivided into sections with the first nine sub-points (Q6, 1–9 mean) involving practical usages including "dealing with an emergency," "asking questions about medication usage," "refilling a prescription," "addressing a new, nonemergency health problem," "asking a follow-up question relating to your recent visit," "seeking additional medical health information about a medical condition," "reporting on regularly monitored conditions (blood pressures, blood sugars, temperatures, etc.)," "reporting on a complex health-related problem," and "reporting on a simple health-related problem." Q6 (10–13 mean) involved relational and emotional issues including "discussing feelings, emotions, and psychological states associated with health-related problems" "discussing relationship issues as they involve your healthcare needs (such as marital, family, or work-related problems)," "discussing an embarrassing medical or emotional health-related problem," and "helping to establish the doctor/patient relationship."

Results indicated that both practical and emotional/relational categories were significantly correlated with efficacy with the practical set of questions being more significant (Beta = .107 at a 0.003 level of significance) than the emotional/relational set (Beta = .071 at a 0.031 level of significance). This suggests that the patients surveyed overall feel that electronic messaging is efficacious no matter the situation (unfortunately even in the case of emergencies—which is not recommended) but that they think it is more effective in practical cases such as getting a prescription refilled or addressing a follow-up question than it is for relational development with the physician or discussion of personal/emotional issues such as discussing problems with their marriage or trying to deal with depression. The reason for this is unclear; however, results might indicate that such personal/emotional issues are viewed as easier to talk about in person. Ongoing, frequent, more elaborate comments might be seen as too involved for electronic message exchange with physicians.

In summary, multiple regressions were run on all questions resulting in eight predictors of the criterion variable measuring patients' perception of efficacy of electronic messaging with their physicians. In descending order of predictability, these were *importance* for health reasons (Q8); *promptness of response* from physician (Q4); *ease of use* (Q2); ability to resolve issues without need for face-to-face office visits (*reduced office visits*) (Q5); *preferred medium for obtaining healthcare information* from physician (Q14.2): *preferred medium of overall communication* with physician (as compared to face-to-face, telephone, and telephone messaging) (Q7); *usefulness for practical medical issues* (Q6, 1–9 mean); and *usefulness in sharing emotional and relational health concerns* (Q6, 10–13 mean).

Specific Physician Population and Response Rate

Although an average total of seventy-three physicians saw patients at the GIMO clinic, forty were practicing internal medicine physicians and faculty while the remaining thirty-three were resident physicians or interns who rotated through the UPMC facility as part of their training. As stated earlier, because of the transient nature of the residents' position, only the permanent staff was included in the survey analysis. Instead, the residents piloted the survey prior to its distribution in order to test its readability, clarity, and length.

A 75% response rate or thirty to forty physicians completed the online survey. Announced orally at the faculty staff meeting on December 22 and January 21, 2010, by the GIMO medical director before an average of twenty-four (60%) of the practicing physicians, the online survey was then distributed on December 23. A first and second reminder followed on January 6 and 20. Responses were accepted through the end of January.

Physician Survey Results: Quantitative

Again, multiple regressions were run to determine which independent variables best predicted the perceived effectiveness of electronic messages between physicians and patients. The final objective in the physician survey (Q 20) asked, "Overall, is electronic messaging between physicians and patients an effective overall means for conducting healthcare?" Only two questions were identified as significant predictors. Question 4 asked, "How often do you encourage patients to use electronic messaging with you?" Those who answered "usually" or "always" were more likely to identify electronic messaging as effective. Likewise, in question 5, those physicians who stated that they responded to their electronic messages from patients within twenty-four hours or almost immediately were more likely to rank this method of communication as effective. This suggests that physicians who identify electronic messaging with patients as effective are most likely to encourage patients to use the method and to answer their patient messages the fastest. This may be because all physicians surveyed were experienced users as a result of being required by UPMC's General Internal Medicine-Montefiore Outpatient Clinic to offer this method of communication with their patients. Whatever the reason, responses to the effectiveness of electronic messaging were overall positive.

Physician Survey Results: Qualitative

Unlike the patient survey, physicians were asked three open-ended questions at the end of their survey. Responses from all three questions generally revealed a strongly positive attitude toward the medium with some limitations noted.[34] Although the sample size of physician respondents was relatively small, twenty-six out of the thirty who did respond filled out one or more of the open-ended questions.

For question 21, all twenty-six out of thirty physicians responded when asked to state the main weaknesses of electronic messaging between physicians and patients. Additionally, in question 23, the physicians were to identify and describe one case that "stands out in your mind." Of the fourteen who responded, five (35%) did so with negative feedback. Throughout both question responses, several limitations of the medium were identified. The most common had to do with *patients* who did not use the medium enough, as indicated by their infrequent reading or responding to physician comments (eight); the absence of nonverbal feedback (four); the inappropriate medical use of the medium such as in an emergency or complicated situation (four); the additional time burden placed on the physician (four); the limited access to the elderly and other populations (three); and a frustration that the space given to patients to respond was either too large (one) or not large enough (two). Other noted limitations mentioned only once each included a concern for confidentiality, the lack of monetary reimbursement for the time spent using these online forums, the possibility of poor response times by physicians, the patients not realizing that messages end up in their permanent records, a desire for more nurse screening in subsequent messages, and, in direct contrast, a desire for less nurse screening due to the delay in receiving the original message.

In contrast, question 22 asked, "In one sentence, please state the main strengths of electronic messaging between physicians and patients." A total of twenty-five out of thirty, or 83%, responded with favorable comments to this question. The most frequent comment made was that electronic messages were convenient (fifteen) with one physician stating simply, "Convenience, convenience, convenience." Also related to convenience, six physicians noted that electronic messaging was an efficient use of their time, three that it allowed patients and physicians to respond at any time of the day, two that it was very fast ("speed"), and one that it eliminates phone tag. Others commented that it is especially effective for use with simple problems such as blood sugars or notification of results (four), it captures what is said by the patient and physician allowing both parties the time to understand and review fully what is stated in the message (four), it is easy to use (three), it is cost effective (two), and it allows for documentation for the medical records (one).

The responses to question 23, which asked about a specific outstanding case of using electronic messages with patients, were varied. In addition to the five negative responses noted above, four simply responded with a "no" and the other five noted positive cases, namely when updating a patient on such routine care issues as immunization status or when a patient requested a prophylaxis. One physician even noted that patient responses were personally helpful, responding, "I have received some very nice feedback from patients via Healthtrak, about my care; which I find to be a boost."

Overall, the physician survey suggests a strong preference for electronic messaging in both the qualitative and the quantitative survey responses.

Comparative, Visual Inspection of Physician and Patient Results

Although nearly identical questions were asked in the surveys to both the physicians and patients, due to the large discrepancy between the two population sizes (physician N=40; patient N=3,212), it is statistically inappropriate to compare the responses. Instead, a visual inspection was conducted to identify possible similarities and differences between the two groups. Compared responses do suggest the need for a subsequent study with a larger sample of physicians and a less discrepant population size.

Physician/Patient Demographic Comparisons

Age and gender comparisons revealed that the population of users for both groups was most predominantly under the age of 65 and female. No members of the physician population were over the age of 65 with 80% between the age of 30 and 49 and 20% between the age of 50 and 64. The surveyed patients were notably older, with 22.4% over the age of 65, 43.4% aged 50–64, 27% aged 30–49, and only 7.2% aged 18–29. Again, females dominated both groups making up nearly 70% of the physicians and over 71% of the patients.

Patient perceptions of physician years of practicing medicine matched fairly closely to physician's actual years of practice. For instance, patients assumed that almost 77.7% of physicians had practiced for over ten years, while physicians agreed that they actually had practiced that long (76.7%). Additional data about their practice was acquired from the physicians. A nearly equal number of physicians practiced between zero and eight (33.3%), nine to sixteen (33.3%), and seventeen to thirty-two (30%) hours per week. Only 3.3% of the physician population saw outpatients over thirty-three hours per week, suggesting again a more academic, urban practice base. Finally, 70% of physicians claimed that they had used electronic messages with their patients for under five years while only 30% had done so between five and nine years. This too reflected how relatively new most of the physicians were to the use of electronic messaging within the practice of medicine. Apparently, most who used the system (again, 70%) did not use it from the time it first began at UPMC General Internal Medicine-Montefiore Outpatient Clinic in 2006.

Basic Messaging Usage Comparisons

Although most physicians (63.3%) defined their electronic communication with patients as “frequent,” only 10.7% of the patients described their own use of HealthTrak for electronic messages as frequent. Instead, patients reported that they only occasionally (65.2%) or rarely (24.2%) communicated this way. Considering the smaller ratio of physicians to patients, it could be inferred that physicians judged frequency differently than did patients, in that they might have felt overwhelmed by what a patient might see as a small number of messages.

At the same time, 95% of the patients who used HealthTrak reported that it was easy to navigate. Although physicians were not asked if they felt the system was easy to use, they were asked how frequently they initiated interactions with their patients as opposed to only responding to electronic messaging requests. Most physicians (70%) reported that they frequently or occasionally initiated messages with their patients while the remainder (30%) said that they seldom or never did. These physicians’ willingness to initiate online interactions with their patients suggests that they accepted this mode of communication right along with face-to-face and telephone conversations as a key means for caring for their patients’ health.

Electronic Communication and Health

In general, 96.7% of the physicians considered electronic messages as helpful in improving the health of their patients. In fact, only one out of the thirty responding physicians indicated that the medium was “unhelpful.” Similarly, over 70% said that they encouraged their patients to use electronic messaging often, usually, or always. Only 10% said that they never suggested that patients use this medium. In slight contrast, almost 90% of patient users found this medium to be helpful for improving their health while nearly 5% (forty-five responses) stated that it was “extremely unhelpful.” It appears in this limited data set (30 physicians vs. 910 patients) that patients viewed this medium overall less favorably than did physicians for improving their health. This was so even though most physicians said they encouraged the use of electronic messaging with their patients.

Concerning how promptly messages were responded to by physicians, about 90% of the patients stated that they received word from their physician within the required forty-eight hours promised by HealthTrak. However, a total of eighty-eight patients (nearly 10%) noted that they were not responded to within this required period (with 1.9% stating that they never received any response at all). Physicians for the most part agreed that messages were responded to promptly, with 93% stating that they responded within the required period of forty-eight hours and 7% saying they did not reach this goal. This delay in response, though small, may be the reason why nearly a comparable percentage of patients (10%) felt that this medium was not helpful in improving their health.

Finally, when asked how often patients' concerns were resolved through electronic messages without the need for a follow-up face-to-face visit, both physicians (86.7%) and patients (77.6%) agreed that for the most part the problem discussed within the electronic message was either treatable or resolvable without necessitating an office visit. This suggests that this medium produces a fairly high perception of efficacy in resolving some health-related needs.

Effective Reasons for Using Electronic Messages: Medical

In responding to the reasons for using electronic messaging, physicians and patients showed agreement for the most part. Two categories were examined: medical uses and emotional/relational uses. The most concerning responses had to do with the use of electronic messages for emergencies. Even though the opening page of HealthTrak warned patients not to submit electronic messages in the case of urgency, some patients felt this medium was appropriate and effective for this purpose. Nearly 40% of patients and only 3.3% of physicians (with one responding physician who said that it was only "mildly effective") stated that electronic messages were effective in the face of an emergency. This response from patients is disturbing in light of the earlier finding that 10% of messages by patients were not responded to by the physician within the mandatory forty-eight-hour period—a time frame that obviously would itself be too long for many emergencies.

The fear is that some patients could find themselves in a serious and/or life-threatening situation while waiting for a physician response that either did not come soon enough or did not come at all. If even one message represented in the 10% that were not responded to by physicians contained a medical emergency, the physician would be held liable for any associated errors. Worse yet, the patient could die. This issue is compounded by the fact that some patients when reporting their symptoms may not realize that their health issue is actually a serious or urgent one. A delayed or ignored response could result in an unnecessary complication or even death. For instance, my own father had a flu shot at his primary care physician's office. As he was driving home, he felt pain radiating down his arm. He called the office when he arrived home and stated that the nurse gave him a "bad shot." When he described the pain, an ambulance was called immediately. He was rushed to the hospital and had had a massive heart attack. Had this been messaged online and responded to forty-eight hours later, he would not have lived. Even if one out of ten messages that were not returned included a case as serious as this one, the efficacy of this method of communication would seriously suffer. The significance of one such serious consequence could outweigh all the effectiveness of the 90% of returned messages.

A second comparable area of concern is with reporting on complex, health-related problems. Although this is possible through electronic messaging, the patients were limited to 1,000 characters, which means that there was little room for discussion of such problems. On the other hand, the physicians had an unlimited response allotment and so could deal with a more complex problem if they wanted to take the time to explain it. Results showed that only 24.6 % of physicians and 69% of patients felt responding to a complex problem was an effective use of the medium. Interestingly for physicians, only dealing with an emergency was seen as less effective than dealing with complex problems.

In contrast, when referring to simple health-related problems, both physicians and patients seemed to agree that this medium was in fact an effective means for resolving health issues. Physicians responded with 83.3% stating it was effective, while nearly 94% of patients stated it was effective. When dealing with less serious and urgent issues, physicians and patients alike saw this medium as quite effective. However, overall, physicians rated the electronic messaging medium as less effective than did patients on most accounts.

The remainder of questions about medical reasons for using electronic messages revealed a strongly positive response from both physicians and patients. Electronic messaging was considered effective by physicians and patients in asking questions about medication usage (93.3% for physicians and 93.5% for patients); refilling a prescription (96.7% and 95.1%, respectively); addressing new, nonemergency health problems (90% and 91.2%); asking follow-up questions relating to a recent visit (93.3% and 95.5%); seeking additional information about a medical health condition (86.7% and 92.6%); and reporting on regularly monitored conditions (93.3% and 94.7%).

Refilling a prescription was regarded as the most effective use of electronic messaging. Seeking new, nonemergency health problems and seeking additional information about a medical health condition were regarded as the least favorable reasons for both physicians and patients. This was in keeping with the notion that brief encounters concerning simple information exchange such as medication dosages and refills were much less demanding of time and complexity than were encounters discussing more in-depth information regarding health information or new health problems. Therefore, considering reasons for use of electronic messaging, this suggests a negative relationship between complexity of problem and perception of efficacy.

Effective Reasons for Using Electronic Messages: Emotional/Relational

Another area in which physicians and patients assessed the effectiveness of using electronic messaging has to do with emotional and relational factors. This area showed marked response differences from using electronic messages for strictly medical purposes. Differences between physician and patient perceptions are also noteworthy.

To begin with, both groups seemed to agree that electronic messaging was helpful in establishing the physician-patient relationship. Nearly 80% of the physicians responded that it was effective with a fairly equal spread seeing electronic messaging as mildly effective (20.4%), moderately effective (25.3%), and totally effective (31.6%) in building these relationships. Although effectiveness in establishing a relationship was ranked significantly higher than the lowest ranking area of emergency use (3.3%), it was still ranked 12% or more lower than any of the other medical categories. This was also true for patients who stated that helping establish a physician-patient relationship was about 77% effective. Although relationship building between physicians and patients online was overall perceived as effective by both groups, it still was not ranked as high as other purposes for communication online.

Beyond physician/patient relationship building, other categories involved patients discussing their own feelings and emotions about their personal medical issues. These revealed very different results for patients and physicians. Most physicians ranked all categories as predominantly ineffective, seeing electronic messages as not especially useful in discussing relationship issues (64.2%), embarrassing medical or emotional issues (60.7%), and feelings (58.6%) associated with health-related problems. In fact, in none of these categories did physicians state that using electronic messaging was “extremely effective.” Their most positive response was only “mildly effective” for each of the categories (relational issues, 30%; embarrassing/emotional, 33.3%; and feelings, 33.3%). Overall, this group of physicians’ responses suggested that relationships could be established with the physicians fairly well with electronic messaging, but discussing issues that were embarrassing, emotional, relational, and feeling-based were not very effective means for helping patients online.

In direct contrast, patients noted a much more favorable response than physicians regarding the efficacy of electronic messaging for these emotion-related issues. In each category, the rating for ineffectiveness was considerably lower with 49.1% seeing electronic messaging as ineffective in discussing relationship issues, 38.5% or so for addressing embarrassing medical or emotional issues, and 44.3% or so for seeing it as an effective means of addressing patients' feelings. Patients overall saw the use of electronic messaging with their physicians as somewhat less favorable than standard medical care (prescription refills and medication changes); yet they still viewed this reason as much more effective for use than did physicians. Upon closer examination, the numbers were even more defining. Although none of the physicians felt that any category was "extremely effective," patients in contrast felt that electronic messaging was "extremely effective" in all three categories, 13.3% seeing electronic messaging as extremely effective in addressing relationship issues, 17.5% in addressing embarrassing medical or emotional issues, and 14.6% in addressing feelings.

Given the strong disagreement on these questions, upon visual inspection of the data, this reason for using electronic messaging seems to be the single most differentiating category of the entire survey. Patients overall feel relationship issues, embarrassing medical or emotional issues, and feelings are effectively discussed within electronic messaging while physicians overwhelmingly do not.

Comparisons of Mediums of Communication

Four mediums for communicating with physicians were compared: face-to-face, phone conversation, phone voice messaging, and electronic messaging. Considerable differences in perceptions of efficacy appeared when comparing physician and patient perceptions of each of these mediums in light of convenience, efficient use of physician time, efficient use of patient time, patient satisfaction, confidentiality, cost-effectiveness, clinical effectiveness, the ability to provide information/education, and the aid in establishing the physician/patient relationship.

Electronic messaging was ranked by physicians as most effective in the following categories: convenience (76.7%), most effective use of physician's time (72.4%), most efficient use of patient's time (76.7%), and cost-effectiveness (64.3%). Patients also ranked electronic messaging highest in the same categories: convenience (81.5%), most effective use of physician's time (79.6%), most effective use of patient time (73.1%), and cost-effectiveness which was called "value for your money" (52.2%).[35] Although agreement was reached in each area, a higher percentage of patients felt that electronic messages were more convenient and were a more efficient use of the physicians' time than did physicians. On the other hand, a higher percentage of physicians believed that electronic messages made for a more efficient use of patients' time and greater cost-effectiveness.

In contrast, patients and physicians disagreed over which medium was most effective for discussing medical education information. Patients believed that electronic messages were most effective for these discussions, while physicians believed that face-to-face communication was more effective (80%). This may be because patients have more time to read and reread the information for improved understanding and memory. Physicians may find it easier to communicate more complicated information orally than in writing.

Physicians and patients agreed in ranking face-to-face communication as the ideal method of communication in the areas of patient satisfaction, confidentiality, clinical effectiveness, and establishment of a relationship. Interestingly, in every case, physicians ranked face-to-face communication higher than did patients. The following comparisons show these results with physicians' percentages written first and patients' percentages second: patient satisfaction (65.5% and 56.4%), confidentiality (69% and 62.7%), clinical effectiveness (89.7% and 69.5%), and establishment of a relationship (93.3% and 86.8%). These results may suggest that taken as a group, physicians view face-to-face communication as more effective in healthcare than do patients.

More specifically, secondary rankings also suggested considerable differences in physician and patient perceptions of efficacy. In the area of patient satisfaction where physicians (65.5%) and patients (56.4%) both ranked face-to-face communication as best, the second-place ranking for each showed that physicians felt that phone conversations were more satisfying to patients (27.6%), while patients felt electronic messaging were more satisfying (33%). Patients only ranked phone conversations as most effective 9.9% of the time. The reason for physicians placing a higher value on face-to-face and telephone conversation over electronic communication than patients is unknown. It is possible that the physicians assume that patients would prefer the personal touch of a phone call over an online interaction. Perhaps with electronic messages having to be forced upon the system by organizational and government mandates the physicians simply believe that outside forces not the general public wanted this change. Perhaps too, these physicians think that their patients want to spend time with them, whereas many of the patients simply want to have their questions answered in as efficient a manner as possible rather than wait to be seen or to get a returned phone call. There is no definite answer to these results, but the key is that the patients and physicians in this study viewed these modes of communication differently within the context of healthcare.

Another area of discrepancy was found between physicians' and patients' rankings by examining all of the categories that were ranked as most effective: First, in the area of clinical effectiveness, physicians ranked as most effective face-to-face (89.7%), followed by personal phone conversation (6.9%) and electronic messages (3.4%). Patients too ranked as most effective face-to-face (69.5%); but electronic messages (20.4%) were ranked as most effective the next most frequently followed by phone conversations (8.6%)

and voice messages (1.5%). Electronic messages were considered by only 3.4% of the physician population (in this case, one person) as the most clinically effective as opposed to 20.4% of the patient population (182 people). These results suggest that physicians may assume that patients will not be as satisfied by the electronic messages as they would be in phone or in-person conversations. This might be because they believe online communication is less clinically effective than in-person communication. Whatever the case, what is most interesting is that these assumptions may affect behavior. That is, the extent to which physicians and patients use electronic messages might be affected by these perceptions and serve as a possible explanation for overall adoption patterns.

In short, electronic messaging overall was perceived as more effective to patients than it was to physicians. However, both groups agreed that electronic messages were most effective in four out of the nine categories while face-to-face was also considered most effective in four out of nine categories. Only in information and education did the physicians (face-to-face) and patients (electronic messaging) disagree in their top rankings. Both mediums of communication significantly outranked the telephone either in conversation or in messaging.

How Patients Obtain Healthcare Information

Both physicians and patients were asked about patient methods for obtaining healthcare information. Patients responded with their own usage patterns in mind, and physicians attempted to project how they thought patients obtained their information. The purpose of this question was to determine if actual usage patterns of patients were different from how physicians thought they were for patients. If different, this might suggest changes in how physicians chose to provide healthcare information for their patients.

Question 18 for physicians and question 14 for patients were parallel in content with multiple sub-questions all trying to determine how patients obtained healthcare information. The first question asked how likely it was that patients received their primary healthcare information from the physician in face-to-face interactions. One hundred percent of the physicians stated that it was likely that patients did so by conversing with physicians: 66.7% extremely likely, 20% moderately likely, and 13.3% mildly likely. This was in slight contrast with patients who said that it was 96.7% likely that they obtained their information in person from the physician with 74.8% saying extremely likely, 17.5% moderately likely, and 4.4% mildly likely. However, some patients (3.2%) felt that it was unlikely that they would obtain their healthcare information from their physician. The mean score out of 6.0 was 5.61 for patients and 5.53 for physicians.

A similar question was asked of the patients but not of the physicians: How likely would you be to obtain healthcare information through electronic messaging with your physician? Although 100% of the patients surveyed used electronic messaging with their physicians, not all of them responded that they got their healthcare information online. The percentage was quite high (96.2%); but, of these users, 3.8% did not feel electronic messaging was a likely place for them to find healthcare information. This suggests that some users may have tried the online messaging service but did not find it helpful for seeking information about their health.

In terms of seeking information by communicating with friends and family, physicians again felt that 100% of the patients would likely do this, while only 65.5% of patients said they were likely to seek information about health from this source. In fact, 80% of physicians responded that it was extremely likely that patients would go to friends and family, while only 19.7% of patients said that they were extremely likely to seek information in this manner. There appears to be a discrepancy in physician perception and actual patient behavior. It is possible that the patients talk about their health and receive information from outside sources without realizing they are doing this. It might not be perceived as "seeking information" but rather "sharing their story." Perceptions may be very different from actual behaviors (for both physicians and patients).

When patients were asked if they obtained healthcare information from friends and family through electronic messaging, their response was strongly divided with a mean of 3.38 and a fairly even distribution across all levels of likelihood. Other low mean scores for patients were found for obtaining information from watching television (3.11), from listening to the radio (2.76), and from reading blogs on the Internet (2.55). Interestingly, mean scores in all categories of physicians' perceptions of how patients obtained healthcare information were higher with the lowest mean being 4.33 for patients seeking their information through reading blogs on the Internet. All other categories had means of 5.00 or above. This is to say that the average scores of patients varied greatly across these mediums indicating that there was little consistency in how they ranked each. The physicians, on the other hand, seemed to view their patients more consistently and believed that they used more outside sources.

In fact, all questions about how patients acquired their health information were responded to with 100% likelihood by physicians indicating that they believed patients were likely to gain medical information from basically any available source. Patients, however, disagreed stating that they were unlikely to obtain healthcare information from reading blogs on the Internet (69.6%), listening to the radio (66.2%), and watching television (55%). The only other categories besides speaking to the physician face-to-face and acquiring information from electronic messages that received a high likelihood of use was obtaining information by using Google, WebMD, or other search engines (88.4%) and obtaining it through reading print media (80.7%).

Therefore, it appears that physicians perceived patients as likely to obtain information from any available source, while patients stated that they were more selective in how they obtained information on healthcare. They mainly relied on face-to-face and electronic messaging with their physicians, using search engines on the Internet, and reading print media about health. This population of patients appeared to rely more on the Internet and print media for healthcare information than they did on other forms of electronic media such as television or radio.

Physician Resources for Healthcare Information

A similar question was specifically asked of physicians: How do physicians themselves obtain healthcare information? This question was added to compare physicians' own use of resources for healthcare information with how they viewed their patients. Indeed, physicians expressed a variety of resources used in obtaining healthcare information. Ranked as number one at 100% was the use of professional journals and books with 66.7% of physicians indicating that they were extremely likely to obtain information in this manner and 33.3% saying that were moderately likely to do so. Discussing with other physicians was nearly at 100% with 76.7% of physicians being extremely likely to seek health information from their colleagues, 20% being moderately likely, and 3.3% being moderately unlikely. Overall, physicians indicated that they were most likely to obtain medical information from discussions with other physicians rather than from other outside resources. Other likely resources for physicians seeking healthcare information ranked as follows:

- Using Google, WebMD, or other search engines: 80%
- Reading popular print media: 43.4%
- Reading blogs on the Internet: 30%
- Watching television or listening to the radio: 30%

Physicians claimed to use a variety of resources but tended to consult with their medical journals and with other physicians the most.

In comparing the physician and patient populations, both groups referred to (other) physicians as the number one most likely place to obtain medical information (both at 96.7% likelihood). Physicians and patients agreed that using search engines on the Internet were very likely resources for obtaining healthcare information (patients 88.4% and physicians 80%). Other resources such as television and radio were ranked low in both groups.

As indicated across this segment of research, it appears that physicians, however, did not see patients as like themselves. They ranked patients as likely to obtain healthcare information from nearly any source available. Patients claimed that they were much more selective in what resources they used to acquire healthcare information. Both groups appeared to be quite similar in their interest in a wide variety of healthcare resources and specific preferences for professional advice (oral and written) and Internet resources. The patient population in this study appeared to reveal more similarities than differences with the physician population as far as how each acquired healthcare information.

Importance and Effectiveness of Electronic Messaging

In the middle of the survey, both physicians and patients were asked about the overall importance and effectiveness of electronic messaging in healthcare. This allowed a comparison to be made between how the subjects viewed the criterion variable of effectiveness both at the half-way point and at the end of the survey. The importance suggested how much patients and physicians valued the worth of electronic messaging in the physician/patient relationship.

Specifically, 93.3% of physicians and 90.7% of patients believed that using electronic messages was important regarding health. Upon examining the subcategories, however, patients appeared to rank this method more favorably with 39.8% saying that it was extremely important, 37.6% saying that it was moderately important, and only 13.3% saying that it was mildly important. Physicians in comparison indicated that only 13.3% thought electronic messages were extremely important, 36.7% thought that it was moderately important, and a surprising 43.3% thought that it was only mildly important. This showed that most patients valued the ability to communicate with their physicians electronically as extremely important, even more so than did physicians.

In reporting the response to overall effectiveness, it was important to examine the same question at the end of both surveys. Questions 11 and 20 for the physicians were like questions 9 and 15 for the patients, respectively. Not only were the questions asked strategically in the middle and end of the test, but they also reflected a binomial measure to determine if the use of electronic messaging between physicians and patients was effective or ineffective. That is, the key was not so much to test for the range of effectiveness but simply to test whether patients and physicians believed the use of electronic messaging worked or not (binomial measure). This was tested at two points in the survey to see if there was consistency in the way subjects responded to the same question when asked in different places in the survey.[36] The difference in how the two questions were asked was that questions 20 (physicians) and 15 (patients) required a response of either “yes” or “no” (effective or ineffective), while questions 11 (physicians) and 9 (patients) used a six-point Likert scale allowing for a range of responses. Binomial collapsing (reducing the Likert scale questions to two categories of either effective or ineffective) for questions 11 and 9 (physicians and patients, respectively) allowed the two forms of the same question to be compared.

To begin with, 96.7% of physicians in question 20 responded with a "yes" in stating that electronic messaging was an effective means for communicating with patients about their health. Similarly, 91% of patients in question 15 responded with a "yes." It appeared that both groups strongly felt this medium was efficacious. However, the individual responses in questions 11 and 9 indicated that only 13.3% of physicians as opposed to 45.5% of patients felt electronic messaging was "totally effective." As could be seen upon collapsing the six-point Likert scale into a binomial measure, only 89.9% of the physicians and 92.7% of the patients ranked this measure as most effective.

Finally, comparing the descriptives on importance and effectiveness of electronic messaging between physicians and patients suggests that patients considered this method of communication more favorably than did physicians. A detailed look at the mean scores (with a minimum/maximum range of 1.0 to 6.0) revealed that physicians scored 4.57 for both categories, while patients scored 4.96 for importance and 5.14 for effectiveness. Again, all in all, despite the differences in the number of physician (30) and patient (910) survey responses, this visual inspection of the data suggests that patients overall seemed to perceive the importance and effectiveness of electronic messaging slightly higher than did the physicians. However, both groups appeared to consider electronic messaging as being a strongly efficacious method of communicating about health.

Summary of Survey Results

Overall, messages exchanged within the Medical Advice link of the UPMC HealthTrak secured patient portal were perceived to be effective as reported by both physician and patient users within Montefiore's Internal Medicine program. Although patients indicated a slightly higher perceived efficacy than physicians, all users ranked the system as being a generally favorable communication medium for the exchange of personal health information with the purpose of gaining medical advice/help concerning medical treatment and professional care.

Discussion: Implications and Limitations

In exploring the implications and limitations of this study, it is important to keep in mind that the key purpose was to identify what factors if any could be identified as predictors of physician and patient perceptions of efficacy concerning online medical communication within EHR secured portals. Since UPMC Montefiore Hospital Internal Medicine physicians were expected to be active users of the online Medical Advice service and since their patients had freely chosen to participate, they both served as experienced users who could potentially help to inform future users about the efficacy of this method for communicating about health. In particular, learning about which factors were associated with patient/physician favorability could further help formulate effective, future implementation plans for adopting EHR online messaging systems. Of course, no matter the outcome, the HITECH Act of 2009 was forcing adoption, but, knowing what perceptions existed, what attitudes toward this medium predominated, and what related factors were associated with effective implementation plans might make the process easier, more efficient, more satisfying for future users, and ultimately more effective in communicating about health.

Since this study involved physicians who were required to communicate through Medical Advice and who were to encourage patient receptivity of this new medium, the likelihood of an overall positive perception about electronic messaging was predicted and found. Both physicians and patients found this medium to be only slightly less effective than face-to-face communication. Surprisingly, patients indicated that electronic messages were more effective than telephone interactions with their physicians. The reason for this might have to do with the medium itself in that telephone communication often involves "telephone tag" in which parties might have to make multiple attempts at getting to the right person for the desired response. Even the process is more efficient with the electronic message. Once the Medical Advice option was chosen, direct access to the physician was possible; however, with the telephone, often many "options" need to be listened to (and time spent waiting) until the appropriate one is named. This might be why patients and even physicians felt that online medical advice was advantageous and time considerate over telephone communication. The medium of email is much more immediate, direct, and ongoing. It makes sense why both physicians and patients in this study listed electronic messages as more satisfying, efficient, and effective than telephone calls. Perhaps once this medium becomes an active part of medical relationships in both rural and urban areas, it could become more popular than the telephone.

Nevertheless, even without the contrast with telephone calls, users in this study seemed to feel that online communication served as an additional means for follow-up questions, clarification, and overall quality of care. In short, the tested medium of electronic messaging was considered an effective form of communicating about health between patients and providers.

Physician/Patient Support of Medium's Efficaciousness

As mentioned earlier, the key question in both surveys was, "Overall, is electronic messaging between physicians and patients an effective overall means for conducting healthcare?" It was asked in the middle and at the end of the survey to test for reliability and the effect of the questions that surrounded it. The answers to both were comparable. First it was framed within a six-point Likert scale and then as a binary-dependent variable (yes/no). In terms of the Likert scale, the physicians ranked the use of electronic messages in the Medical Advice link as slightly more favorably than patients did (with physicians at 96.7% and patients at 91%). However, once the two measures were collapsed into a binomial scale (so they could be compared on like scales), physicians responded slightly less favorably than patients (with 89.9% for physicians and 92.7% for patients). The difference was small with the end results in both cases indicating overall support of efficacy from both groups.

The second set of results that showed that patient favorability was greater than that of physicians, however, did suggest that patients (more so than physicians) viewed the medium of electronic messaging as a natural means for communicating with people in general. Communicating about health online was likely not something new to those participating in this study as they very well may have been doing so with their friends and family for some time. Physicians may have been doing the same thing with their friends and family. For patients, communicating with their physician may not have been any different than communicating with their teacher or boss. For physicians, however, this marked a significant change in their job responsibilities and called to mind concerns of HIPAA laws, medical liability, and safety/quality issues for the patients. In the end, they both responded that this means for communicating between physicians and patients worked effectively. The differences, though, might have reflected the newness of this medium for the medical profession. To know if this influenced the results, however, more questions would have needed to be asked and results compared concerning general online usage patterns (as done in the rural physicians' survey in chapter 4).

Key Predictors of Efficacy

Multiple regressions that ran in both studies identified the key predictors for the criterion variable of efficacy, the primary determinant of the two research studies. A slight yet significant overall difference existed between the physicians and patients, which may have been expected due to their personal goals and roles associated with using this medium.

Predictor for Patients

As earlier discussed, for the patients, there were several key predictors, but the most significant one was represented by the question, "How *important* is the ability to communicate with your physician using electronic messages in regard to your health?" It seems that patients thought online messaging with physicians through the Medical Advice link worked well if they also felt it was important to their healthcare. The key word in their reading could have been "healthcare," more so than "important." That is, in answering this question, patients may have felt that online communication is simply vital to health and patient involvement. Since it was being incorporated into their own physicians' offices, they may have believed it was important and working (efficacious), possibly because it empowered them as involved, active patients (Tonsing, 2014; Warner & Warner, 2015). Unfortunately, without asking follow-up questions and comparing the results, the relationship between these two variables can only be surmised.

Additionally, something that is important to someone, does not necessarily have to be considered efficacious. If electronic messaging is important to patients, they certainly would *want* it to work, but it does not necessarily *have* to be working for them to think it was key in their healthcare. In applying this information to future use of EHRs, several questions come to mind: How should physicians, hospital representatives, or even the government, teach patients why communicating through the EHR medium is so important to their health? Would such training facilitate effective implementation in a rural area? Would making EHRs appear to be more important to patients' health (through promotion, education, etc.) help EHRs themselves to be considered more efficacious? If someone perceives EHRs as efficacious, does that mean that they do work or that they are just seen as working? How might EHRs be implemented in a manner that users would realize their importance to their health and in turn find them improving their medical relationships and health results? Medical professionals would do well to think about such questions as the process of implementing EHRs, secured health portals, and interoperability continues.

Another question must be considered: Did perception of importance *cause* the perception of efficaciousness or did the two merely correlate in this study? Statistically speaking, the critical answer to this is that *they merely correlated.* This must be kept in mind when drawing conclusions or applying changes in how EHRs are introduced into new areas. Perception of efficacy does not cause perception of importance or vice versa; one merely tends to be present when the other is present. However, the fact that the two coincided in this study in a significant manner showed that there was a relationship between them that is worth thinking about when designing and carrying out future implementation plans.

The real questions are: How does one measure importance? How does it get taught? How can EHR secured portal interactions be efficacious? One solution could be to ask patients follow-up, open-ended questions utilizing focus groups: “What is the key reason why you feel electronic messaging is so important for your health?” “Under what circumstances might electronic messages exist and *not* work?” “Would there be any cases in which electronic messages are not really important to health?” Besides open-ended questions, another possibility would be to add two additional objective questions in the survey about basic usage of electronic messaging and the Internet: “How often do you email your friends?” “How many times throughout the day are you online or texting?” If this study were to be repeated with a different population, such questions could be added to the original survey.

When examining results of the multiple regressions, no significant relationship was found between how patients viewed and used the medium of electronic messages outside of health and how they used them inside of the healthcare setting because no questions about general usage were asked. The *rural study* included such questions regarding the overall use of the surveyed physicians in general. This was done to understand what the climate or potential receptivity of this new medium might be. That was not the case in the urban study. All questions were related to the medical interaction. It might be preferable for future studies to reflect upon how patients were accustomed to communicating online both privately as well as within the work environment.

Correlations between “the importance of electronic messages in a person’s daily communication” and “the importance of electronic messages in a person’s health communication” may have supplied data that could have distinguished between the importance of the medium with the importance of health. If the medium worked for other aspects of their lives, then it would be more likely to be viewed as working in the medical aspects of their lives. This, again, was looked at in the rural physician study (with a positive relationship shown), but it was not examined in the urban physician study. “Importance” might have predicted perception of efficacy in sharing health information, but it might also have simply indicated a perception of efficacy of the medium itself regardless of the type of information shared.

More information on patient patterns would help clarify why “importance” for patients was the key means for their perception of efficacy. This information would be needed to appropriately formulate predictions on what might help make patients more receptive to online communication with their physicians. If this study was to identify factors that could have helped with rural implementation, then the key predictor of “importance” would have needed to be clarified as to what made it so important. That is, was it the fact that it was unique to health or that it was important to all aspects of the patients' lives? If it was the former, then health-related educational programs and instructions on EHR usage may be the answer for future adoptions; if it was the latter, then getting patients to accept the medium overall in life may simultaneously allow patients to use that medium more for health. This would be especially relevant for rural populations. That is, if rural areas do not have high-speed Internet for communicating online, they may not use the medium as much and may not see the day-to-day value in it. For positive implementation in a rural region, instruction may need to center on getting people used to the medium in general before getting used to it in light of health. Again, the reason for why the correlations between perceived importance of the medium in health and perceived efficacy may have nothing to do with health and physician/patient communication and everything to do with patient familiarity with the medium itself. Most likely a difference would be found between using the medium for health verses using it for daily communication, but the point is that one cannot predict this if it is not first tested.

Predictor for Physicians

On the other hand, the physicians' predictors of the criterion variable of efficacy were related to a more measurable, behavioral aspect of medical communication. They were, "How *often* do you encourage patients to use electronic messaging with you?" and "On average, how *promptly* have you been able to reply to your patient's electronic messages?" These questions provided measurable data and clearly only related to the medical setting. If physicians advocated patient usage, then the patients would be more likely to try the medium, the physicians would be more likely to read and respond to emails, and the merits of the increased usage might be more easily realized. Likewise, if physicians answered the patients' electronic messages quickly, this may have indicated that physicians had the medium more readily at their disposal (such as when smart phones ring or vibrate to alert a new message came in). This also may have indicated that physicians viewed the messages as being important enough to answer very quickly or that physicians were already used to answering electronic messages in other aspects of their life in an active manner.

To determine what influences such a prompt response and encouragement of the patients, additional questions concerning usage again would be helpful. It would be interesting to see what the correlation between the following two questions would be: "How often do you check your personal electronic messages throughout the day?" and "How often do you check your patient messages throughout the day?" This sort of information about general usage that was gathered in the rural physician survey may have been interesting also to have been gathered here; however, it may have significantly increased the length of the survey, something that may have discouraged its completion by the subjects. Perhaps a follow-up set of questions could have been sent later to these physicians to see what their patterns of usage were outside and inside of health-related interactions. These considerations would be useful in future research studies.

Efficacy versus Satisfaction

Up until the time of this study, the vast majority of articles and studies dealing with electronic health communication focused on patient *satisfaction* as if this was a measure of whether or not this medium works in providing effective healthcare (Harms et al., 2004; Arora, 2003; Fong Ha & Sug Anat, 2010). Initially, physicians argued that online communication with patients would interfere with office efficiency, privacy, emergency versus nonemergency care, medical malpractice, and patient safety (Stahlberg, Yeh, Ketteridge, Delbridge, & Delbridge, 2008; Kassirer, 1995). They argued against the medium as they did not feel it would work in the medical environment in which relationships and face-to-face interactions were of paramount importance. To them a satisfied patient was less important than one who received proper care. Satisfaction was a bonus, but quality of patient care came first.

As the Institute of Medicine (IOM; Committe on Quality Health Care in America, 2001) clearly stated, it is the patients' right to be treated using various forms of communication including not only face-to-face but also online, electronic communication. Although often resisted by nonadopting physicians at the time of initial implementation,[37] the IOM argued that it was the providers' medical responsibility to communicate in a way that safeguarded patient care and kept compliance with the HIPAA laws in the process.

Furthermore, as stated in Williams (Patient Satisfaction: A Valid Concept?, 1994), the vast majority of studies that claimed satisfaction merely reported on an aspect of consumerism instead of on what was working best for the needs of the individuals involved. Consumerism was certainly an influential dynamic within the medicological environment. Physicians and hospitals were investing huge sums of money into EHR systems and were paying even more to support and maintain secured portals.[38] However, the question remained, should consumerism propel the EHR market forward without the issue of efficacy? Even the National Health Organization (NIH) used satisfaction as a measure of quality in many public health sectors (1983) and subsequent research continued to use this as a key determinant of whether a health-related endeavor or instrument of measurement was valid (Baggs, 1994). As Williams (1994, p. 515) further noted, "Patient satisfaction questionnaires do not access an independent phenomenon but, in a sense, actively construct it by forcing service users to express themselves in alien terms; consequently, inferences made from their results may misrepresent the true beliefs of service users." Despite these arguments against the term "satisfaction," inferences continued to be drawn and decisions made in healthcare based solely on the idea of whether or not the patient was "satisfied" as opposed to whether something worked better in caring for patient health. In comparison to efficacy, satisfaction is a vague, "alien" term. The latter is more conceptual while the former is more behavioral and measurable.

It is therefore important to emphasize that this research attempted to determine whether people perceived online communication to be working during early adoption. It did not ask for satisfaction, but rather it attempted to see what variables correlated with the idea of efficacy in helping to determine specific areas that could help influence effective adoption of this medium.[39]

Methodological Design and Results

Methodologically, there are also limits in what can be concluded from this study. The use of multiple regressions for both sets of surveys helped to identify which of the questions or categories of questions were the best predictors (independent variables) of the criterion variable (dependent variable), "Overall, is electronic messaging between physicians and patients an effective overall means for conducting healthcare?" Again, the reason for posing this question was to see what the most important variable might be for implementing electronic messaging within secured portals of EHRs. When examining correlations between the questions and the key dependent variable of "perceived efficacy," a lot of information was gained, but the information was not generalizable since the contribution of each predictor variable could not be determined by a simple comparison of the correlation coefficients. The beta (B) regression coefficient therefore was computed to assess the strength of the relationship between each predictor variable and the criterion variable. When the residual plot of the patient data sets was found to be nonlinear, it was necessary to transform the raw data to make it more linear through the use of a linear regression. This process neither increased nor decreased the linear relationship between the variables but instead preserved the relationship and allowed the information to be more useful.

Distribution of residuals within the patient charts did not appear to be normal. However, the distribution looked much more normal in the analysis where the dependent variable was transformed. The data points were close to 1, indicating how close the data were to the fitted regression line or coefficient of determination for the multiple regressions. At 0%, this would have indicated that none of the variability around the mean was present, and, at 100%, this would have indicated that all the variability around its mean was present. Upon visual representation, the data points appeared remarkably close to the regression line. There was much less distance from the mean after transformation, indicating how strong the predictor was in its responsibility for the variation.

This process of using multiple regressions would have been helpful if it had been applied to the rural data set in chapter 4 as well. Alone the rural study is informative. However, using multiple regressions would have provided a greater deal of useful information about the rural physicians' perceptions. Likewise, conducting both studies would have provided still more useful comparative data. This is something to be done in future studies that would provide data and allow for a test of the significant correlations between rural and urban populations.

Finally, the survey data in the rural region did not include patients. Pitt-Johnstown students were used to provide at least some insight into how everyday people were thinking about online communication between physicians and patients. The results, however, were inconclusive. Patients as represented by college students did not have any real familiarity with online medical communication. This indicated just how new this medium was to rural patients and, unfortunately, did not provide any specific information about their characteristics. Perhaps instead of asking about specific incidents, it would have been much better to use a standardized survey to gain additional information about the usage patterns of the students. That may have at least shown how they used various mediums as compared to other urban users.

In short, of all the limitations in drawing any conclusions comparing the rural and urban data sets, the most important ones were the need for similar survey measurements, the inclusion of both patient and physicians being evaluated for each region, and the seeking of information about media usage in general for both (not just the rural) populations.

FUTURE DIRECTIONS OF URBAN AND RURAL RESEARCH

In review, when comparing the results of the rural and urban research studies, it is impossible to draw any statistical conclusions between the two since there were too many differences in their design, implementation, and purpose. Creating an all-inclusive, over-arching study that was implemented and designed symmetrically between all aspects of this environment was never the intent of the research in this project, however. The point was to explore, sample, and describe systematically what the environment was like starting with the rural physicians. Each phase of the research naturally compelled the next phase with new sets of research questions that were responded to through new studies. This discovery process sampled multiple methodologies in an effort to explore various perspectives on this environment. In so doing, suggestions have emerged for redesigning subsequent surveys, for repeating research with varied populations, for combining and comparing similar data samples, and for identifying additional means of observing the environment.

Oral Histories

In response to the conclusions and insights from the oral histories of this project, subsequent interviews might approach new questions and potential audiences in an effort to frame, shape, and inform further understanding of this medicological environment. The following additional oral histories are recommended for comparative, in-depth, qualitative, future data collection:

- *Repeat oral history interviews with rural physicians.* It would be helpful to reinterview rural physicians (chapter 4), who by 2015 were transitioned out of the Stages of Meaningful use into Medicare Access and CHIP Reauthorization Act (MACRA) of 2015 and the Merit-Based Incentive Payment System (MIPS). This Quality Payment Program (QPP) created a new framework that rewarded clinicians for their level of quality care.[40] Comparisons between past, present, and future oral histories would provide insight into the history and future of rural adoption. It might suggest ways for those who have not yet adopted to do so in a more effective manner.[41]
- *Conduct oral history interviews with urban physicians.* This is a missing piece that might provide tremendous insight in the comparison between urban and rural adoption differences. It would be quite interesting to find out if any similarities between how urban versus rural physicians first reacted to and used online messaging with patients and various EHR components. Questions should explore their memory of the transition process, their feelings toward the new medium as it was first introduced, their possible change in perception over time, their perceived difficulties and how they overcame these, their experiences with their patients, and their suggestions for how the process might have gone more smoothly.
- *Conduct oral history interviews with patients from both rural and urban areas.* The voice of patients and how they experienced this environment is a key missing element. Although surveys were conducted, the qualitative aspect of research was not included, partly because of precautions about identifying patients and physicians and partly because of the time and difficulty involved in conducting such interviews on a broadly diverse (and overlapping) population. Patient demographics such as age, gender, race, educational level, socioeconomic status, and location could easily affect the adoption practices. It would be interesting to identify patient perceptions

of best practices, adoption methods, physician/practitioner responses, systemic problems, and overall perceptions of the users.

- *Conduct additional oral histories on nonadopting physicians from both rural and urban areas.* It would be interesting to identify the reasons for adoption refusal. It would also be interesting to identify what other options these physicians chose such as early retirement, concierge practices (retainer medicine),[42] cash-only practices, and volunteer or foreign medical practice work. Comparing their views about technology and the healthcare climate with the views of those who already elected to adopt would be most efficacious. Not only might this group provide insight into the thoughts, feelings, and experiences of nonadopters compared to adopters but also into other available options that might exist and foster improvements in the existing option provided by the government. All of these responses to the new medium and to medical practices in general affect the overall influences within the entire medicological environment.
- *Conduct oral history interviews with people from other countries* who have already used or are planning to use EHRs and related secured portals to see how they responded or plan to respond to this transition. Granted, different political and socioeconomic infrastructures may deeply contrast with the U.S. system, whose current EHR adoption rate by 2013 was only at 69% (Robertson, 2013). These could, however, shed light on how some countries implemented early adoption (such as the Netherlands and Norway who were at a 98% adoption rate by 2010) and how some might begin the process in the near future (such as many South American and African countries).[43]

The comparison between earlier and more recent oral histories might suggest what similarities, relationships, and patterns might emerge from the qualitative data. Additionally, this information could help shape and inform future research design and implementation to further understand the complexities of the medicological environment.

Surveys

Once the oral histories would be collected and analyzed, a wealth of questions would likely surface to help formulate both objective and open-ended surveys. Some specific suggestions for survey development follow:

- *Surveys should include questions on patterns of general technology use and not just patterns of online medical communication and health information seeking.* This was a deficit in the urban studies as without this information there was no way of even surmising if the physicians and patients were reacting to the general technology of electronic messages, the medical messages, or both.

- *Surveys should ask follow-up open-ended questions* when possible. The issue with the online survey was that patients might inadvertently mention a name or some other identifier which would cause concern for privacy. Follow-up questions were conducted by the physicians since they were already quite aware of HIPAA regulations; but patients could not be trusted to do this. If an IRB was obtained that allowed surveys to be distributed in a room and then followed up with oral discussions, focus groups, or one-on-one interviews, this might allow more information to surface.
- *Surveys should be as similar as possible for correlational purposes* not only for physicians and patients but for different groups of physicians and patients (in this case, urban and rural). As earlier mentioned, this was the problem with the previous set of studies in that the data collected could not as easily be correlated.
- *Multiple regressions* should be done on all surveys that attempt to predict the effect of multiple independent variable's on a given criterion variable (as in "efficaciousness" in the current studies). This is what was missing in the rural study.
- *Follow-up surveys on similar groups of people would be helpful to measure how responses change over time.* As suggested above, longitudinal studies are helpful in oral histories, but they are more easily compared and analyzed if the measurement (survey) is the same each time it is sent out to the subjects.
- *Surveys should include research questions on various types of electronic messages and types of mediums through which these messages are transmitted.* When this research began in 2009, the popularity of text messaging for instance did not exit. Now, many forms of electronic messaging exist and are used readily as part of physician/patient and physician/physician communication including but not limited to texting (Brooks, 2015), Facebook (Bosslet, Torke, Hickman, Terry, & Helft, 2011; Benabio, 2013; Mearian, 2012), and Twitter (Greyson, Kind, & Chretien, 2010). Because of this changing focus that is more prevalent today than it was at the time of this study, this information would be extremely important to add to a survey on electronic messaging.
- *Comparison of survey data should be made as best as possible with national surveys which themselves may help guide the types of questions asked.* Pew Research Center and the Joint Commission along with a wealth of other available government agencies continue to research the ongoing adaption process.

These suggest some of the more important considerations applicable to this environment in light of healthcare surveys.

Additional Methodologies

Many other research methodologies may be used to study the medicological environment in relationship to online physician/patient electronic messaging. These suggestions are by no means meant to be comprehensive, but they do outline a few methods directly related to this overall study.

- *Focus Groups.* As stated earlier, when UPMC began the implementation process of the Medical Advice link, it conducted focus groups that explored the perceptions and insights of patients and healthcare workers concerning this medium. There are many ways in which focus group methodology has been applied in this area (Liamputtong, 2011). Ideally, it would be interesting to begin with separate groups of users and those who influence the system such as patients, physicians, healthcare workers (including the "screeners" who direct the incoming messages), health administrators, insurance companies, and government officials.
- *Critical Incident Technique.* This methodology often applied in health-related studies would be an excellent one for *active* users of the system. The reason the study conducted on students at Pitt-Johnstown was so inconclusive was because (1) students for the most part said they never experienced (or, in some cases, never heard of) online communication with their physicians and so had no "incidents" to offer; (2) the user age was relatively young meaning that they may have not sought medical care as much as older adults (as found in this patient survey where users tended to be older than college age students with nearly 93% over the age of 30); and (3) the students apparently did not have enough experience with the healthcare system to even "imagine" a particularly effective or ineffective use of online medical communication. However, if the CIT was used with active users, particularly those in the study discussed herein, much more specific information may be gleaned. The age and rural location of the student subjects did not yield informative data; however, by altering the age and level of experience with the medium, a greater number of incidents might provide very helpful insights into what is effective and ineffective when using online medical communication.
- *Data Mining and Natural Language Programming* (chapter 6). One of the key areas that have not been discussed herein is the content of the messages themselves. Various means of examining these messages may help to inform future research design as well. For instance, by observing a sample of conversations at the beginning, middle, and end of a thread

> of interactions between several sets of physicians and patients, a qualitative analysis might show change in usage patterns including the topics, language used (such as more medical terminology over time), and relational changes (such as a shift from "I" to "We"). A wealth of information could also be obtained through natural language programming and computational linguistics wherein a computer could systematically identify patterns of conversations and clusters of word usage through descriptive content analysis.

Each of these methods would allow for a more in-depth analysis of the environment depending upon the focus and purpose of the research design. Each does allow for critical exploration of the medicological environment and encourages an ever-increasing understanding of the depth and complexity of this space of interlocking forces of change.

CONCLUSION

Collectively, this multi-methodological approach captures the climate, perceptions, and expectations of physicians and patients shortly after the HITECH Act of 2009 became law. At the time, the rural area for the most part was just becoming introduced to electronic charts. For this reason, the rural study discussed EHRs and not so much electronic messaging. The purpose was different with the urban studies because EHRs were already being implemented even before the government mandates. The focus in the urban study, therefore, was more on electronic messages while the focus in the rural study was more on EHR adoption.

As stated, it would have been quite helpful if both the rural and urban populations were studied in the same way using the same surveys and analyses, but each group was in a different stage of development. Asking questions about electronic messages in a survey to patients (as demonstrated in the Critical Incident Study with students) was premature and thus yielded no information other than showing that few, if any, knew about online communication with physicians at that point in time in rural America. Therefore, as consistent as it would have been to do the exact same survey on both physicians and patients in rural and urban areas, it simply was neither practical nor logical to do so.

Originally, these were not intended to be compared since initially only rural areas were being examined through surveys and oral histories. After the rural studies were conducted, patterns of behavior became identified through the interviews, survey questions became developed, and a need to study physician behaviors and media reception in general seemed to be the most logical next step in trying to understand the overall medicological environment of the rural area.

Likewise, both groups adopted EHRs at a different time with urban areas exploring their usage well in advance of any governmental laws while rural areas did not for the most part adopt until they were forced to do so by law. Therefore, each population was at a different stage of implementation. As discussed earlier, there was overlap in these two areas, but that overlap occurred more so because rural patients often sought specialized care in urban regions. Whether or not those rural patients were able or willing to use the online messaging services could not be determined. In short, the rural city of Johnstown was only beginning to adopt EHRs due to government mandates while the urban region of Pittsburgh already began the process on its own years prior to these mandates.

Based on the findings of the urban surveys, once again it is important to reflect on the rural area as a space in transition wherein the information learned from the urban surveys might have shed some light on the developmental process of EHR and online communication adoption. As discussed in depth in the early parts of this chapter, many factors set urban and rural areas apart. The fact that urban areas had greater broadband access, larger university educational systems (UPMC Health Systems and the University of Pittsburgh) that shared grant acquisition, less economic challenges overall, and even different working demands of health professionals, all made the two populations quite distinct. Likewise, depressed areas did exist in urban clusters such as in the Pittsburgh Hill District, but based upon the U.S. Census Bureau these areas did not similarly represent the depressed, more expansive region of the rural area of Johnstown. Johnstown did have access to Pittsburgh health facilities and online communication with physicians, but often the broadband accessibility and speed was not as good as that found in the city, making the secured portals available but not accessible to the rural users.

Both rural and urban regions exist within the medicological space. Both learn from each other over time.

NOTES

1. The "means" included but was not limited to the existing broadband accessibility, the already-existing infrastructure of technology, and the financial backing of much larger institutions.

2. In this section, information on the rural environment is presented in more detail as it continues to contrast the differences between the two environments, particularly in light of the observations made and conclusions drawn herein.

3. This method of defining is a historic change in the ways in which regions are categorized when creating a census. Therefore, noting the specifics of how categories

are currently made is relevant to the perceptions within the medicological environment at the time. According to the U.S. Census Bureau, “Beginning in 1910, the minimum population threshold to be categorized as an urban place was set at 2,500. ‘Urban’ was defined as including all territory, persons, and housing units within an incorporated area that met the population threshold. The 1920 census marked the first time in which over 50 percent of the U.S. population was defined as urban. The Census Bureau revised the urban definition for the 1950 census by adopting the urbanized area concept, to better account for increased growth in suburban areas outside incorporated places of 50,000 or more population. This change made it possible to define densely populated but unincorporated territory as urban. The Census Bureau continued to identify as urban those places that had populations of 2,500 or more and were located outside urbanized areas. . . . For Census 2000, the Census Bureau adopted the urban cluster concept, for the first time defining relatively small, densely settled clusters of population using the same approach as was used to define larger urbanized areas of 50,000 or more population, and no longer identified urban places located outside urbanized areas. In addition, all urbanized areas and urban clusters were delineated solely on population density, without reference to place boundaries.” See https://www.census.gov/history/www/programs/geography/urban_and_rural_areas.html.

4. Johnstown drew national attention for its depressed status. It is noteworthy to mention that rural areas throughout the United States are more likely to experience depressed status for the very reasons discussed in this segment. That is, overall, rural areas have more poverty and wider clusters of poverty than in urban areas. According to the U.S. Census Bureau, of all the persistently poor counties across the United States, over 85% of them were found in the nonmetropolitan areas (United States Department of Agriculture Economic Research Service, 2015). This supports the notion that Johnstown represented a small rural city relatively typical of those found across other regions of the United States.

5. It is to be noted that despite the logic in this argument, research seldom, if ever, tested out for “rural populations.” Part of this might have been oversight or part practicality. Not only was it difficult to test out for “rural” but not all members of rural populations identified as rural. The elderly people in Johnstown, for instance, who knew the city as a city likely would never consider themselves as living in a rural area. Labels are relative and affected by the users’ personal experience and perceptions.

6. Typically, the acronym, UPP-GIMO, is shortened to GIMO. GIMO will therefore be used for the remainder of this document. It will be assumed that this refers to the clinic within Montefiore Hospital whose medical director at the time of this study was Gary S. Fischer, MD.

7. From the time of its inception through the time of this research study, “UPMC HealthTrak” was the name of the patient portal system which was linked to the EpicCare (MyChart product) EHR Health Record system. In the fall of 2013, the portal was rebranded as MyUPMC with the home page housed, managed, and designed directly by UPMC. Specifically, the home page was reconfigured with settings from the standard program. Through a series of emails on June 24, 2014, Dr. Gary Fischer of UPMC Montefiore Hospital explained that this change was dictated by business needs and the underlying belief that the MyChart home page was not fully

user-friendly. He stated, “The homepage is now housed by UPMC and just ‘calls out’ data tiles from Epic’s MyChart.” This means that when patients selected an option such as “send a message to your doctor,” they were launched into a section of MyChart (a “tile” or self-contained subprogram that could be launched independently from the UPMC home page) that maintained all the original functionality of that section of MyChart. Each time they left one of these internal links, they went back to the UPMC home page and then could launch into another “tile” of MyChart. It is to be noted that UPMC used a variety of EHRs including Cerner and Varian. Fischer then indicated, “There is a desire to eventually have a single portal through which patients can view all their data, regardless of the source system.” This information demonstrates how rapidly and continuously these systems changed over time.

Likewise, as of April 2015, in a newly added feature, MyUPMC showed results from tests performed prior to the date patients registered for MyUPMC. Another new feature announced on the website was an email notification update stating, “MyUPMC has turned off the appointment notifications feature to reduce the number of email messages you receive. These notifications include: ‘Appointment Scheduled,’ ‘Appointment Canceled,’ ‘Appointment Missed,’ and ‘Appointment Changed.’” Users could elect to keep these notifications by signing into their account and selecting the “profile settings” tab to update the preferences. The fact that these updates were occurring indicated that patients complained that they were getting too many emails and too much communication with their use of the health portal. This interestingly demonstrates the potential problem of too much email for both patients and physicians.

8. As noted earlier, “Epic” is a brand name of an EHR vendor to which only large systems could have access. For a more detailed explanation of Epic’s capability, see the following link: https://www.epic.com/software-phr.php.

9. Although not an integral part of this study, it is to be noted that eVisits required a fee if the medical need was resolved within the electronic message. All Medical Advice entries, which exclusively were used in this research study, were responded to free of charge.

10. It is to be noted that Fischer was also medical director of HealthTrak beginning summer 2003 when he started HealthTrak at GIMO. By July 2005, he began increasing his role in the EpicCare team and was involved with HealthTrak enhancement requests through the Fall of 2007. Thereafter, Grant Shevchik, MD, took on the role of Medical Director of HealthTrak as indicated in status reports in the Spring of 2008. Although Fischer’s leadership role in this capacity diminished, he continued to be involved in decision-making on HealthTrak as a member of its steering committee. The significance of this is that his continued hands-on experience with this system provided insight into the interpretation and understanding of the results of this study

11. Some changes were made to the HealthTrak software over the time of this study; however, this change was more so concerning design than content. The system, of course, will continue to change.

12. UPMC, Aetna, and Cigna insurance companies at the time of this study agreed to reimburse for such visits. Over time, more and more companies recognized online visits as worthy of reimbursement and therefore had preestablished fee guidelines in

place. This is even more so the case today than it was at that point in the medicological environment.

13. The allowance for 5,000 characters for patient discussion was neither increased nor decreased after the implementation of eVisits. This suggests that the patients were later found not to be writing overly lengthy notes assumedly since most of their conditions were already outlined through the guided question/answer system.

14. Although not a significant issue with the online survey portion of this study, message length is particularly relevant for further research on the content of these messages.

15. According to Fischer, this rarely happened to him in all the years he was associated with the system; and it was not something that was called to his attention by other physicians either (personal communication, October 6, 2011).

16. In short, there are two main reasons as to why messages intended for particular physicians were not always first read by the physicians themselves: First, some messages were inappropriately placed in Medical Advice when they should have been sent through to another link such as to billing or prescription renewal. By having the messages prescreened, the messages more efficiently were redirected to the appropriate party or, if necessary, were addressed by the screeners themselves. This simply saved the physician time. The second reason was for patient safety. When screeners identified that a message was an emergency, it could be addressed immediately without any delay in transfer. Even in nonemergency cases, screeners acted as a double assurance that the medical need was forwarded and addressed by the appropriate party for each patient as soon as possible. It was designed as a check and balance system within HealthTrak for the safety and health of all patients.

It is important to note that from the patient perspective, there was no way of knowing that anyone other than the designated physician was receiving the initial message. If a patient's note was redirected to a different party, then the patient was made aware that the message was intercepted by someone other than the intended physician since the individual's screen name appeared at the top of the page. If the note was responded to by the desired physician, the patient was aware of this too since the screen name of the physician automatically appeared at the top of the electronic message. Once the initial contact was made with the physician, further electronic messages could be conveyed back and forth more directly between the physician and the patient while still being housed within the secured portal of HealthTrak.

17. Such specific routing information concerning HealthTrak messaging is vital to note if one were to study these messages from a content analysis point of view. This also is important to note when determining the patient/physician perception of efficacy as compared to other systems that may be deemed more or less efficacious but that may be characterized by uniquely different usage patterns and regulations. Comparisons can only be made between systems that are similar in functionality and design.

18. It is difficult to assess how well such a message delay would hold up in the court of law, especially if the hospital was amid initiating a new system. Some have argued that it is the patient's shared responsibility to attempt another method of contacting the physician, especially if the case is an emergency (Warner & Warner,

2015). After all, the secured portal front page clearly stated that no emergency-related messages should be left in a message. It remains possible that ignoring a message could be considered patient "neglect" in a court of law. The computer systems do not erase the messages. Human error is just as possible over a phone as it is through an email.

19. As in any form of communication, there is an ethical issue associated with misrepresenting oneself as someone else. Therefore, if there is ever a case where someone uses another person's username, the healthcare workers are expected to indicate from whom the message was sent and from where the information itself was retrieved. Those who send messages are accountable by law for the authenticity and accuracy of their own message. In light of confidentiality issues, patients who think they are speaking to their physicians may reveal private information that they would not otherwise choose to share with another healthcare professional. It is important not only that it is clear that these Medical Advice messages are being forwarded to the appropriate physician through a nurse or other healthcare professional but that it is actually being answered by the person who owns the email address.

20. See http://www.gpo.gov/fdsys/pkg/FR-2008-11-21/pdf/E8-27475.pdf.

21. In many cases, systems are designed to self-identify. For instance, in university and college email portals, student names typically appear automatically to the receivers unless somehow the identifier is blocked by the sender. This can be the same in healthcare; however, one never knows for sure if the user is actually the person identified through that message exchange system since so many different workers may be checking messages in any given day or week. That is, someone could use someone else's email or the general office email address. Such misrepresentation could cause particularly dangerous consequences if misinformation is exchanged. This is true with any email exchange, but due to HIPAA Laws of patient privacy and safety, this is especially concerning in healthcare.

22. Since patients were not identified, it was not possible to make this distinction.

23. When this study was originally created, the possibility for following up the surveys with a content analysis of the messages themselves was considered. Although that segment will be discussed as part of future research proposals (chapter 6), the preparation of the population had to be managed carefully in order not to create potential confusion for future studies related to this population. In short, the survey and potential content analysis research of this study utilize the very same population. The only differences that might affect future research is the element of time. That is, the actual messages were created by the physicians and patients between January 2006 and April 2010. The surveys, however, took place beginning in December of 2010 through January 2011. It is logical to assume that some patients who had originally written Medical Advice messages during this time period no longer had medical connections with the GIMO practice during the time of the survey due to switching physicians, relocation, health changes, and even death. This would mean that if the content were studied separately from the survey responses, the number of participants (N) would be different since the number of survey respondents and the number of people who actually participated in creating the messages were inevitably different due to time and attrition.

24. Also, PACT was not a part of GIMO and was considered a separate department and clinic. Likewise, the confidentiality issues of PACT precluded any use of this data.

25. Concerning response rate calculations, see above section.

26. If the content of these messages would be assessed, then who is deceased and who is not has no bearing on the population since it is the messages of the actual users that is relevant and not who is or is not still alive and around to actively use the system (which is the case for the surveys). It is important to note this, however, so that further research on content analysis may be applied at a later date with these numbers already recorded.

27. According to http://www.ctsi.pitt.edu/erecord.shtml, the website for the Clinical and Translational Science Institute, CARe provided information and advised investigators about eRecord research registries and recruitment alerts. It also assisted with the preparation of research data, letters of support, and budget justification language related to the eRecords. If necessary, CARe also provided help when in need of an Honest Broker (internal mediator) in helping to locate, manage, and facilitate access to eRecord data. This project, however, did not require additional assistance from CARe since CARe acknowledged the authority of the QI Committee for review of this study.

28. All patients were sent a "First Reminder Letter" in which patients who already responded were thanked and those who had not yet responded were sent a reminder to do so again within the next two days. Since there was no way of identifying which patients did or did not respond, this letter had to be sent to everyone, and it served as a subtle reminder that the participants' privacy was being maintained. The remainder of the letter was similar but not identical to the first. A "Second Reminder Letter" was later forwarded again to all patients. The content was like the previous letter and again asked that a response be made within two days if one had not already been sent. Again, the link was provided, but, as stated earlier, it could not be accessed if the survey had already been filled out by the patient. All responses were gathered through and stored in SurveyMonkey with the opportunity to apply a wide variety of analyses through SPSS and the SurveyMonkey service.

29. It was stated that the survey should take only about ten minutes. It was also noted that the residents' comments could be "made up if you want, but in any event, will be anonymous because the survey does not collect identifying information." The link to SurveyMonkey was then provided and the information gathered to see if any problems arose with the administration of the survey. None of this data was part of the final data collection.

30. This indeed was a limitation of the SurveyMonkey program.

31. This is an indirect yet purposeful incorporation of the CIT study design that was used and discussed in chapter 4 with the student patients. Since these urban physicians were active users, asking about an incident seemed to be a logical way to solicit possible details about extremely effective and/or ineffective uses for this medium.

32. The content of the letters discussed the research study surveying all physicians in "UPP-General Internal Medicine in Oakland" about electronic communication with

patients using UPMC HealthTrak. It was noted that since GIMO was approaching its seventh year of electronic messaging with patients, there was an interest in physician assessment of overall use, efficacy, satisfaction, and level of patient-centered care provided by this medium. Each physician was told that he or she was "chosen" to take the survey as a member of the UPP-General Internal Medicine group who participates in UPMC HealthTrak. It was stated that the survey would take only fifteen minutes to complete and that no names would be linked with email addresses so that there would be no way of identifying who provided which responses. The survey was said to be "voluntary" and was requested to be filled out by following a SurveyMonkey link within two days. The number and name of Gary Fischer, MD was supplied because he was part of the administration of this study and his name was familiar to everyone involved.

The "First Reminder Letter" was even briefer than the original one. It thanked physicians who had already responded and asked those who did not, to do so within the next two days. Again, assurance of the anonymity of the response and the value of the project was noted. The "Second Reminder Letter" did basically the same thing and asked that it be completed "as quickly as possible" and added, "Trust that your time and effort in doing so is most appreciated." Each letter was signed, "Gary Fischer, MD."

33. See discussion section for further comment on the implications of the term "importance."

34. Although it was assumed that physicians would follow HIPAA laws, it was reinforcing to remind them not to identify anyone in their response.

35. Although "value for your money" and "cost-effectiveness" were the same thing, the latter phrase seemed to fit better from a physicians' business perspective and the former phrase from a consumer-oriented perspective.

36. It is possible that a subject might become influenced by the test questions themselves and might in turn answer the same question differently throughout various points of the examination. That is, placement of the question might affect the response.

37. In the various talks that I did in 2009 and 2010, I would receive comment on the IOM's proposal. One gastric bypass surgeon who used emails with his patients (through his nurses) argued that the government has no right to force him into communicating online. He saw the IOM as a liberal organization that was telling him inappropriately what he did and did not have to do. Others argued against him, but the point is, such attitudes existed in the "fight" against the secured portal requirements of healthcare.

38. My husband's solo practice implemented a secured portal by 2012 which cost about $5,000 for the program, setup, and training. We then had to pay a monthly fee of over $400 to maintain this service. Therefore, the portal within which the online medical communication occurred (as mandated by the government in the HITECH Act of 2009) was not only costly to set up but also to maintain. This was an investment which may or may not have been felt to be of value to the "consumer," who in this case was the physician/hospital.

39. The term "efficacy" and the phrase "perception of efficacy" might also be challenged in that one's perception that something is working does not necessarily

indicate that something actually is working. To prove that electronic messages work may be considerably difficult as "Working" is a term that would need to be defined in multiple ways: Is it working so far as efficiency? Is it working so far as cost-effectiveness? Is it working so far as systemic, mechanical functioning? These and other such related questions cannot really be answered at this time since the product is so new and since so many *different* products (EHRs) are being used. Many hospitals are on their second or third EHR system. Does this mean that the old one did not work? The answer would depend upon whose perspective was taken: financial, patient satisfaction, patient perception of efficacy, efficiency, ease of use, and so on. Indeed, this study chooses to look at perception of efficacy as it is defined based upon the users' perceptions of whether it is working for them individually. If members of the medicological environment perceive it as working, does it really matter if it is? In other words, if it is seen as working, then the adoption of EHRs may be smoother and more people will choose to implement and work out the problems. There are indeed many ways of looking at this distinction. This book chooses a general one better applied to the overall space of the medicological environment.

40. See https://www.healthit.gov/topic/meaningful-use-and-macra/meaningful-use-and-macra for explanation of the program in use as of 2018.

41. At the time of this publication, the large-group rural physician practice that had not converted to electronic records (chapter 4) no longer uses paper charts and therefore, no longer garners government penalties of the Stages of Meaningful Use as well as various MACRA/MIPS programs.

42. Although this type of medicine can utilize EHRs and a wide variety of physician/patient mediums for contact and relationship building, the key is that it does not typically take insurance payments, which means that the patient pays an upfront, typically monthly fee out of pocket that covers most general services during that period. Additional fees may be charged for special services as predetermined by the practice. Since it does not necessarily need to involve insurance companies, it is not bound by EHR mandates for acquiring reimbursements for services. This is one of many ways concierge medicine functions within the system without fear of government penalties. This is legal and becoming increasingly more popular throughout the United States motivating physicians and organizations to find creative ways to collect fees without the control and influence of insurance company reimbursement rules. The idea is for middle-class Americans in particular to acquire Affordable Care through a predetermined monthly fee paid to the physician with or without any use of services. For additional information, see Wieczner (Pros and Cons of Concierge Medicine, 2013) at http://www.wsj.com/articles/SB10001424052702303471004579165470633112630.

43. According to a Bloomberg Business report on June 25, 2013 (Robertson), the top ten countries for EHR Adoption were Norway (98%), Netherlands (98%), the United Kingdom (97%), New Zealand (97%), Australia (92%), Germany, 82%), the United States (69%), France (67%), Canada (56%), and Switzerland (41%).

Chapter 6

The Paradigmatic Shift within the Medicological Environment

The medicological environment is not a new space. Paul Starr's *The Social Transformation of American Medicine: The Rise of a Sovereign Profession and the Making of a Vast Industry* (1982) identified this changing environment and the multiple forces within it, as medicine moved from a physician-based and physician-controlled practice toward a conglomerate of for-profit industries and sociopolitical corporations that promised to transform even more significantly the future of medicine. Starr's vision itself influenced how historians and planners viewed this turbulent environment (Geiger, 1983).[1] Likewise, this space continues to change as it responds to multiple influences and adapts to interdisciplinary perspectives that together affect the face of healthcare today.

Combined with government mandates, political power, economic challenges, insurance industry and healthcare reform, demographic limitations, and medical malpractice (to name a few), this environment has been forced to incorporate age-old regulations such as the Hippocratic Oath and relatively more recent HIPAA laws into the new demands of this changing space. As technology has evolved through computer programming, cloud computing, and improved broadband access across the country, so too has the power of technology altered how physicians and patients communicate about medicine, now with secured electronic messaging within EHR systems throughout hospitals and medical practices. These changes have created a shift in perception, affecting not only medical science personnel but all people who communicate about health. This medium continues to transform daily health behavior, practice, and research and affects the very ways in which people engage within the multidisciplinary healthcare arena.

Now eMessages between physicians and patients are a permanent part of the medical record, ever available to be examined, tested, researched, compared, challenged, and reused for purposes and in contexts potentially far exceeding the private office visit. Now medical information recorded online becomes a global data bank—a resource for epidemic tracking, treatment options, international classification of diseases, insurance claim abuse patterns, and, yes, even patient/physician relationship development. Much information may be gleaned from the data preserved in the medical records. So long as privacy rights of patients are maintained through deidentification practices, researchers are free to examine not only patterns of disease evident and important in the science of medicine but also patterns within the interactions between physicians and patients that could shed light on their dyadic communication and its effect on the art and science of medicine.

Intriguingly, the interrelationship between new trends in research, online technology, and healthcare practices reflect a significant change in the way medicine itself is viewed. As EHR systems continue to compete at all levels from independent private offices to physician and hospital conglomerates, the goal of interoperability between practices, hospitals, and international medical sites remain a challenge. As healthcare professionals focus on more immediate responses to practical health matters, the evolving transition toward a fully electronic, interactive, and interoperable system pushes forward with or without the blessings of the users. The healthcare system perhaps remains too overcome with the process and technicalities of the transition to take pause and witness this paradigmatic shift propelled by EHRs and online medical communication.

Indeed, the Economic Stimulus Act of 2008 followed by the HITECH Act of 2009 requiring the use of EHRs and then the Affordable Care Act of 2010 have all indelibly influenced the way medicine has been viewed, used, and applied. Over the past years, however, healthcare professionals have struggled to keep up with the nuances of these policies. Technological advancements continue to influence patient treatments and outcomes at all levels. These include such things as computer-assisted and robotic surgery, a plethora of mobile applications from weight control to heart monitoring, and over 700 different certified EHR systems by 2013 alone (Verdon D. R., 2013). By 2017, the number of EHR system vendors grew to 11,000 (Wade, 2017), and the market promises to experience exponential growth in response to ongoing competition, diversification, and specialization.

Similarly, according to Topflight (2019), five key developmental technologies are predicted for the future (in ascending order of competition): specialty matching services (which match need with availability of practitioners and are necessary to address the predicted 90,000 doctor shortage by 2025), operations optimization (Health App development), new EHR systems and functionalities (growing at a rate of about 6% of new companies per year including Apple's Health App patient integration system, part of iOS 11.3

beta release), health transportation and first response (such as continuous software update systems that facilitate device-based location information for 911 call centers), and telehealth (a 30% predicted increase of products in 2019 alone involving digital health self-monitoring technologies that link to practitioners' offices and medical records). In the process of learning how to adapt, learn, change, apply, and reeducate when using newer and better equipment, apps, and systems, the healthcare workers are challenged to keep up in a profession that simultaneously and necessarily demands efficiency, effectiveness, and quality in the pursuit of "saving lives." These technologies have become a source of change for the patients, the healthcare professionals, and the researchers in medical science and communication alike.

Kuhn (1962) argued that something new, an "anomaly," must arise that is so different that it draws attention to the way in which things have been previously viewed. A "crisis" period ensues, marked by confusion, uneasiness, and unrest. This leads to the need for the puzzle to be solved, to be approached in a new way so that the normal, everyday method of seeing things might creatively incorporate this vastly different yet necessary change. Kuhn was not referring to EHRs themselves, but his concept of the paradigmatic change appropriately fits considering the transformative nature of this new medium in the world of medicine. As physicians rightfully cling to the traditional physician/patient relationship (the one-on-one, face-to-face method of care), a new, *additional* way of communicating has emerged through medical eMessaging in a time and space so immediate yet far reaching and continuous that the face of medicine as it once was known no longer exists in its traditional form.

Medicine does not typically avoid the influx of technology when it comes to medical practice advancements. It historically welcomed new medical equipment that facilitated the monitoring of patients, advanced surgical instrumentation, and even bionic body parts (Locke, 2014). Electronic messaging within EHRs, however, is not equipment that alters the direct *physical* care of the patient[2]; rather, it introduces a new way of interacting with the patient—something much less concrete and, yet, perhaps, much more effectual and transformative. Without question this transition into EHRs and online medical interaction has helped influence a paradigmatic shift that can only be appreciated by looking at the entire medicological environment, the historic space within which multiple forces dynamically interact and bring about something much larger than the individual working parts.

This concluding segment reexamines this transitional process or "shift," identifies how this is being translated into current interdisciplinary applications and approaches, outlines evolving problems that are surfacing due to these changes, and ventures to predict new collaborative trends characterized by shared health decision-making and patient advocacy. The underlying effects of EHRs and electronic medical communication may seem in and of themselves quite fundamental, insignificant, or even incidental to this paradigmatic shift. However, the fact is, not only do they affect the process of communication between physicians and patients, but they also affect the method for storing, retrieving, and analyzing these messages. These messages represent an enormous wealth of "Big Data" that promises to create tremendous opportunities for research based upon the recorded medical information in the charts and the recorded electronic medical messages (Mayer-Schönberger, 2013), as well as promising a decrease in health risk (Bates, et al., 2014) and healthcare management (White, T., 2018). These represent vast repositories of information that might be used for research within multiple disciplines. The possibilities are immeasurable and, for the most part, unrealized (Bresnick, 2019). The very face of medical research, education, practice, and communication is on the verge of change.

SHIFT IN PHYSICIAN TRAINING PERSPECTIVE

A significant change exists in how physicians are trained in response to the underlying transformation of the medicological environment. This reflects a somewhat different perception of what it means to become and remain a qualified physician today. Granted, standards of physician training accreditation have always been closely monitored by a range of authoritative bodies that monitor and provide education credits to physicians.[3] Their purpose has not changed, but some of the requirements within the programs they monitor are being reassessed and revised while preparing physicians for board certification. In short, the "art" of medicine is being recognized alongside the "science" of medicine with the humanities being recognized as an important element in medical training. Science, technology, engineering, and mathematics (STEM) programs are being tested against STEAM (with "A" being arts, creativity, and the humanities) programs with remarkable responses from the public (Hiram, 2015; Barzansky and Etzel, 2018).[4]

Medical School Training

In medical schools today, medical humanities divisions such as those at the University of Arizona' College of Medicine and the NYU School of Medicine have surfaced within an environment better known for its scientific method of training than for its humanistic approach to learning. For instance, Southern Illinois University School of Medicine, established in 1970, is now internationally known for its innovative methods of teaching, problem-based learning, and testing techniques with a humanities education so integrated throughout its medical school curriculum that about two-thirds of each medical class choose to take humanities electives (SUI School of Medicine, 2019). The art of medicine is coupled with the science of medicine as innovative approaches like Columbia Medical School's Narrative Medicine Program emerge as significant fixtures in a field once hesitant of such intermingling with the arts (Columbia Narrative Medicine, 2019).[5] At Columbia, literature-based character analysis and story writing not only are part of the classroom but a part of the medical rounds and focus group discussions that follow these rounds. Learning about a patient involves discussing the stories that surround that patient. A recognition of the importance of both the humanities and the sciences is certainly evident in many of the most prestigious medical schools in the United States.

This is not to say that science no longer exists as a primary field of research and the curriculum; rather, this demonstrates that communication and the humanities are becoming welcomed additions in a field of evidence-based, scientific research and application. As the Association of American Medical Colleges (AAMC) reports, "Humanities programs help medical students see life through a patient's eyes" (Krisberg, 2014). Of course, patients must be central in medical treatment, but rarely has their perspective been considered of equal importance to the expert physicians. That is, traditionally the patients seek medical treatment and the physicians provide it. Now, however, the communication between the physician and the patient is considered as important, if not at times more important, than the treatment itself. A very different focus continues to emerge.

Premedical School Training and Entrance Exams

The change is happening even before the medical school. A national longitudinal study conducted by Hiram College (2015) discussed the benefits of an undergraduate health humanities education, noting better Medical College Admissions Test (MCAT) preparation, interpersonal skills, leadership training, and commitment to fields that continue to experience physician shortages such as psychiatry, pediatrics, and primary care. The number of these programs quadrupled across the United States from 2000 to 2016 from fourteen to fifty-seven. Prevalence of such programs continues as attention to this change at the undergraduate level rises (Lamb and Berry, 2017).

College admissions processes have likewise been altered to attract students from a wide range of backgrounds, not just from the traditional biology or chemistry majors of undergraduate school. In March 2013 (Mount Sinai, 2013), The Icahn School of Medicine at Mount Sinai in New York City announced the restructuring of its admissions criteria under its Donald and Vera Blinken FlexMed program in which half of its medical school classes were guaranteed early acceptance in their sophomore year of college without having to take the MCAT or even having to participate in a traditional premed course load which some have argued has not changed in the last 100 years. As stated by David Muller, MD, FACP, Dean for Medical Education, Professor, and Marietta and Charles C. Morchand Chair in Medical Education, “FlexMed is all about flexibility in your education and the opportunity to pursue what you love to learn. It allows talented students with lots of initiative to ‘flex’ their intellectual, creative, humanistic, and scientific muscles during college” (see Mt. Sinai, 2019). The program aims to create self-directed and lifelong learners, who can explore classes of particular interest such as health policy, ethics, genetics, and biostatistics as undergraduates without being limited only by traditional classes in organic chemistry, biochemistry, and physics. The FlexMed concept grew out of Mount Sinai’s Humanities and Medicine (HuMed) program that started in 1987 and evolved into the very first program in the United States to offer early acceptance to sophomores with a background in humanities. The argument is that those students with humanities backgrounds have been just as prepared as previous students, performed commensurate in measure with those from other academic backgrounds, and had no significant difference in MCAT scores and college grades (Chen, 2013).

Finally, in response to this trend, on February 6, 2015, the Kaplan Test Prep center announced that premed prerequisites for taking the new MCATs had changed in that the typical high school courses would no longer have to be a year of general biology, a year of physics, and a year of organic chemistry (Minasi, 2015). Not previously revised since 1991, this new MCAT exam first administered on April 17, 2015, includes additional content knowledge in upper-division biochemistry, introductory psychology, and introductory sociology as well. It is advised, however, that not all such college courses will meet the needs for passing the MCATs and not all medical schools will change their premed coursework requirements despite these MCAT changes. In effect, the transition continues.

Board Certification and Continuing Medical Education

Such a change in requirements, test taking, and medical course curriculums cannot and will not happen suddenly. Nevertheless, the shift is now being seen at all levels of the preparatory, testing, and medical school process. In fact, even in the area of postgraduate medical education for state certification—the continuing medical education (CME) credits for the state of Pennsylvania, for instance—physicians are required to complete at least twenty credit hours of study every two years with twelve of the twenty credits in the area of "patient safety or risk management." The latter includes but is not limited to education in communication, patient relational topics, and electronic messaging practices for physicians.

The Meaning and Direction of This Medical Education Shift

It may be asked why information on premedical coursework, MCAT content, medical school education, and postgraduate board certification matters in a book on electronic messaging within secured EHR portals. First, education in how patients and physicians *communicate* online and how physicians interact with their patients (such as using a laptop in the room with the patient) are all part of this training process because it focuses on the accuracy, clarity, security, safety, and overall effectiveness of the *transmission* of medical information between physicians and patients (and, in this case, through the medium that provides eMessaging). These are, for the most part, traditional communication topics that are adapted and specialized for the education and training of not only physicians but all healthcare professionals.[6] This body of knowledge includes what has commonly been referred to as the study of "health communication" and/or "rhetoric of science" in the field of communication as well as the study of "medical communication" and/or "medical humanities" in the field of medicine. The fields overlap and interrelate both in research and application. The key is that this interdisciplinary approach between communication and medicine has transformed how students from both disciplines are looking at the field and, in turn, certainly promises to alter how the *patients* view it as well.[7]

A paradigm shift is occurring within the medicological environment at all levels of the medical profession and at all stages of its educational process. Communication studies are an intricate part of this process as well. The impetus toward change in large part has been the introduction of electronic messaging within EHR portals. This certainly is not to say that only messaging has caused this massive shift in education, but this educational shift is closely interrelated with the increased attention to medical humanities, communication studies, and online technology. This project focuses on the key element of eMessages, which has surfaced and been popularized as a direct result of the mandates of the HITECH Act of 2009. This movement has paralleled the introduction of humanities into curriculums and rekindled the centrality of the medical relationship as being both an art and a science. The electronic medium has accelerated this transformation and has reinforced the need for relationship studies in medical communication during the entire process of EHR conversion and the newest, most transformational, addition of online communication within secured portals.

SHIFT IN RESEARCH

Throughout the previous chapters, this book has taken a multi-methodological approach in order to examine this complex, dynamic environment from as many different observational perspectives as possible. Oral Histories, surveys, and the critical incident technique were used to acquire both qualitative and quantitative information about the perceptions surrounding EHR implementation and the use of electronic medical messaging. The EHR medium was examined from a McLuhanesque media perspective, keeping in mind the transformational power of its impact on how practitioners not only perceive the medium (EHRs) and the eMessages related to this medium but also on how patient relationship development and institutional engagement within the healthcare environment manifests. These varied forms of observation resulted in considerable insight into the use of this medium and the overall climate of the medicological environment during this time of transition.

Now, as a result of the massive amounts of recorded data produced by EHRs themselves (health record data) and by the electronic medical messaging (communication interaction data), physicians and hospitals alike hold at their disposal an unfathomable wealth of information that is available for use in future research. Many willing partners such as those working in health science, health insurance, medical economics, medical communication, and the government eagerly await the opportunity to analyze these massive data sets. Although practicing physicians themselves may choose to use their electronic records exclusively to care for their own patients, their office and hospital EHRs continue to produce data that many researchers anxiously await gaining access to. Improved system interoperability, broadened IRB permission standards, and prescreened data storage banks of deidentified personal information all prepare and enable the environment for expanded applications of future Big Data research.

The curiosity and interest in this massive data collection is great, but the methodology necessary to use and interpret this type of data is quite different from the previously demonstrated methods. Therefore, it is important to examine some of the possibilities that this additional methodology might hold for the future of medical and communication research. To disregard the wealth of information stored within EHR systems across the country would be to ignore one of the most promising future possibilities of this new medium.

Big Data Research in Medical Science

The process of the scientific method first requires a systematic observation of the environment and review of literature. A potential research question is then formed based upon these observations. This leads to a hypothesis that predicts the potential relationship between and among the variables (phenomenon that exist in more than one state). The relationship is then statistically tested, reported on, and discussed for application to future research. What is important to note here is that the researcher begins with the *observation* and makes educated predictions of the effects the variables might have on each other. Since the time of Roger Bacon (1214–1284) and the introduction of inductive reasoning, this scientific method has predominated the evidence-based body of medical and social science research despite arguments for and against less traditional methodological approaches (Taylor, 1996). Granted, many methodologies are useful and recognized in these fields, but this method has remained the foundation of medical science.

In distinct contrast, today a very different method of observation has emerged in response to the endless production and storage of vast amounts of data derived from electronic charts and online messaging. Everything having to do with the medical transaction and overall medical decision-making process is stored, including who accesses EHRs, where information is forwarded, and when these transactions take place. Every aspect of online communication between the medical professionals and the patients is also documented, word by word. Even length, time, and speed of response are recorded as well as who originally entered the data and who may have "signed off on" (physician endorsement of information in the electronic chart) or corrected it later. All entries and actions remain visible. Nothing is deleted. Even this metadata, or "data about data," is in many ways as relevant to the information stored in EHRs as the patient charts themselves and is likewise necessarily protected by the laws of privacy (the Sedona Conference, 2010; AHIMA, 2013, Kayaalp, 2018).[8]

This is strikingly different from how medical records had traditionally been stored and safeguarded in paper charts. Anyone with access to the physician's office (including cleaning personnel) could look at a chart without anyone else necessarily knowing it was accessed. A telephone message or office visit could be commented on in the paper chart the same way it can be in the electronic chart, but, now, if an electronic message is transmitted or someone gains access to the password protected data, that process information is recorded automatically without anyone having to summarize or remember to put it in the chart.[9] Data is constantly being produced at a pace exponentially faster than ever before, and this production, study, and use of this data marks a clear paradigmatic shift in research as it applies to the functioning and understanding of the medicological environment. The environment has changed markedly as a result of making electronic charts and messaging available. Now, how the environment is *studied* is also changing.

As stated by Raghupathi and Raghupathi (2014), "Big Data analytics has the potential to transform the way healthcare providers use sophisticated technologies to gain insight from their clinical and other data repositories and make informed decisions." They argue that Big Data analytics and applications to healthcare are at a "nascent stage of development," but the pace is picking up as more and more data is gathered and methods for analyzing that data are created through computer program analysis. Certainly, there remain concerns about privacy, security, and standards of governance, but, as these authors argue, Big Data will become more and more mainstream with the increasingly widespread implementation and use of Big Data analytics across the entire healthcare industry. This change will continue well into the future.

Genomics and Medical Discovery

An excellent example of how this process works and has fully changed the nature of research (and in turn the medicological environment) is demonstrated in "Sergey Brin's Search for a Parkinson's Cure" (Goetz, 2010). Brin explained that the traditional model for research using the scientific method took about six years. By contrast, he said, he came up with an online survey of questions in which he recruited about 10,000 Parkinson's subjects, acquired their DNA through the 23andME project (see below), analyzed it with a data mining program, compiled the correspondence between parties who discuss symptoms in surveys, did an analysis with a query on 3,200 subjects whose results were returned within twenty minutes, presented the paper to the Royal Society of Medicine in London where he showed that people with GBA (a gene) are five times more likely to have Parkinson's than those without it, and published the report only eight months later. This turnaround time, using such a large data set from collection to publication, would have been totally unfathomable had all this been attempted to be done by hand. The methodological process of hand-analyzing data was markedly different from the process that Brin employed.

In data mining, *the hypothesis emerges from the data rather than the hypothesis emerging from human-eye observations of potential relationships. The relationships are identified by the computer.* Then the hypotheses can be tested and retested with the use of variously controlled separate data sets. As demonstrated in Brin's example, data mining through word recognition programs can enable vast amounts of gathered and stored data to be analyzed quickly and efficiently to identify patterns that may suggest relationships between and among variables. Once these relationships are identified, further testing of the relationships using more traditional forms of research may resume. The computer's ability to first identify these clustered patterns that suggest potential relationships between often unsuspected variables makes using Big Data research especially unique and challenging.

This method has also been discussed in the *New England Journal of Medicine* (Annas & Elias, 2014) concerning the 23andMe genetic-testing company (which was used in Brin's research above) and their iSpot.tv commercial (found at http://www.ispot.tv/ad/7qoF/23-and-me) in which a full genetics background was then advertised for only $99 as a means for the company to garner one million samples (until it was argued that it did not comply with FDA standards of regulation to discontinue new consumer access until the regulatory process was reviewed). This shows how easily and readily consumers are willing to allow their health data to be gathered in an effort to learn more about their own health even while risking massive data collection disclosures about themselves. This demonstrates that the data collection of medical information follows rules and procedures that have not yet been fully devised and ethically assessed as each new study could open yet another legal and/or safety challenge for the patient in particular and the healthcare profession in general.

As information is gathered, stored, and tested, the scope and magnitude of this process is only beginning to be appreciated. As the HITECH Act of 2009 prepared for requirements in Stage Three Meaningful Use for interoperability between EHR systems, healthcare researchers recognized the need for systems not only to "talk to" each other but to share the data with each other, and with this "sharing" came massive regional and even national storage centers that could access and study information that is forever preserved. This meant that not only could a person see a physician one day in, say, southern California and fly the next day to Memorial Sloan Kettering Cancer Center in New York, but the entire health record could be instantaneously accessible to the entire team of informed specialists who could be ready to care for the patient immediately upon arrival. Additionally, the data contained within that medical chart could be analyzed against millions of other patients with a similar disease or health problem—no matter how rare—and be treated upon arrival to a fully informed and prepared medical staff.

This is where the medicological environment is headed, and this dream is nearly realized as current facilities are joining forces to form web portal alliances with industry. In 2015, for instance, a portal called the "Massachusetts Clinical Gateway" began uniting the Massachusetts Life Sciences Center, the Conference of Boston Teaching Hospitals, and the University of Massachusetts Memorial Medical Center. The organizers were seeking to hurry the process of "linking biotechnology and medical technology companies that fill out online forms with academic researchers across Massachusetts" (Weisman, 2015). Fourteen teaching hospitals were to be part of this portal system in the hopes of developing global research (Walsh, 2015). This is one example of the gradual, evolving process of earlier attempts to collaborate, readjust, and adapt to the magnitude of information and the research potential of this plethora of data.

Now, such gathering of resources is notable, but it is predicted that all such data may become centrally located and used for storage and research. Not only will EHRs of the world be interoperable, but the information within those systems will be interchangeable and usable for individual as well as for global research. With EHRs Compound Annual Growth Rate (CAGR) valued at U.S. $24.7 billion in 2018 and predicted value of US$ 36.2 billion by 2025 (Energias Market Research, 2019), the generation of data to be used not only for record-keeping of personal histories but also for the analysis of global health patterns of disease, outbreaks, and effective treatments holds tremendous promise for the future of global health (Sundermann, 2019).

The Medium and the Method: An Historic Perspective

With the advent of the computer came much more data, and with more data came new problems in managing and studying that data. When considering the massive data sets that are being produced by EHRs today, it is almost unimaginable how anyone could single-handedly analyze this magnitude of information. Without being able to "observe" or compare underlying phenomenon within these piles of data, it is just as unlikely that a relationship between potential variables could be noticed. In pondering this, there are two things to keep in mind: First, the very nature of the database's size necessitates a more sophisticated method of observation. Second, the nature of the data is created by the medium itself. That is, vast amounts of data are gathered and stored *because* the computer programs designed for this process *can* record and save so much. The only way to analyze it is to create yet another computer program to do so. Again, the medium's storage and management of information leads logically to the process of Big Data analysis.

Some may argue that this is not the way it needs to be nor even should be. Perhaps in earlier days the "trial and error method" as well as the "accidental method" yielded plenty of remarkable discoveries. Early on, observations were made with very little instrumentation. To generate millions of samples would have taken a lifetime or at very best many people, so researchers used as many samples as they could until a pattern or relationship surfaced.

In his book, *Visual Explanations, Images and Quantities, Evidence and Narrative* (1997), Tufte describes numerous historic examples that involved painstakingly laborious hand calculations. Eventually, these led to significant research findings that in turn saved many lives. In 1854, John Snow, the "Father of Modern Epidemiology," created maps that he translated into early forms of bar graphs and then used these to help discover the source of cholera.

He found that most of the deaths clustered around a specific water pump in London, and he eventually proved that cholera was transmitted through the water supply. His visual representation of the patterns he observed led to his discovery. Likewise, Florence Nightingale, pioneer of nursing and reformer of hospital sanitation, started by plotting a "polar-area diagram" to display visually where deaths were occurring throughout the hospital and outlying areas. As a result of her meticulous, graphical representation of descriptive statistics, her discoveries helped to change the face of hospital sanitation. Both Snow and Nightingale were able to collect and analyze their data by hand because the volume of information, though relatively quite large, was still manageable enough to do so. Their visual representation of "clusters" of data allowed them to notice relationships between unexpected variables and led them to remarkable discoveries.

The tediousness of these earlier research methods demonstrated how difficult such a discovery process was without the use of a computer.[10] Now with even larger databases, the possibility of identifying relationships and making discoveries by hand seems all but impossible. Indeed, the method of pattern recognition discussed by Tufte was the precursor to the modern data mining program analysis used with medical data today.[11] Computers have vastly changed this process and made such calculations and data gathering much less tedious—at least from the perspective of hand tabulation, recognition of patterns, and determining correlations between variables.[12] Now the problem is different. Now the data is available and collected, but specialized computer programmers, expert in the language of the particular program design, have to figure out not only how to collect, enter, store, and secure the information, but also how to *interpret* the results.[13] This requires a team of skilled experts in such areas as medical science, computer programming, analytics, and communication (to name a few).

While the medium of the computer has generated such huge data sets, its ability to store and sort this volume of data requires a computer program to sift through the information to identify patterns. In short, the irony is that the medium that has created this volume of data is the only medium that can in turn manage and interpret this same volume data. Some may justifiably argue that this endless resource overwhelms and distracts the medical professional (from timely patient care) while merely creating vast stores of useless information that may be either never used or at best difficult to access (Kuntzmann, 2018). Some may argue that the high level of redundancy caused by creating electronic charts with repetitious entries, required check boxes, and automatically produced form letters create so much information that it is difficult to find what is important within the medical chart. To a large extent, these arguments are valid as there certainly are limitations due to the design and implementation of these EHR systems. As Bowman (2013) states, "Poor EHR system design and improper use can cause EHR-related errors that jeopardize the integrity of the information in EHRs, leading to errors that endanger patient safety or decrease the quality of care."

These systemic usage issues continue to be addressed by EHR developers, but they do not in any way diminish the importance of the medium itself. Fundamentally, EHR data is produced to facilitate record-keeping and continuation of effective patient care. However, the repository of data that is held within these EHR systems across the country is, nonetheless, an excellent resource for analysis. Some might argue that EHRs were mandated (and marketed) by the government only to improve patient care; others might even say it was for government control over information (Hsieh, 2019). As shown in chapter 3, many scenarios could be considered as this medicological environment has been shown to be affected by multiple perspectives and influences. Whatever the motivation, EHRs facilitate patient record-keeping and communication; and, in the process, they also produce vast amounts of data for research.

Big Data Research in Interactional Descriptive Analysis

There are many ways to analyze Big Data. This section demonstrates one approach using descriptive analysis of interactive content within the medical record, specifically, the Medical Advice exchanges between physicians and patients within secured EHR portals. In this example, the purpose was to determine whether a pattern of shared language over time might be identified within the physician/patient electronic messages. There is no way of accessing such information in actual in-office visits since these interactions are not typically recorded as they occur. Rather, the conversations are transcribed by the physicians into the electronic charts in their own words. That is, the physicians listen to, interpret, and record the conversations; they do not record actual conversations in process. In contrast, the data collected through the electronic exchanges of this medium are the raw, word-for-word conversations that result from an online exchange. With the help of computer programs, the individual words used throughout the interactions may be analyzed for unique traits, for medical content, and, in this case, for how words are used and shared over time by the physicians and patients throughout the relationship.

Although this example represents an unpublished research study, I include it here not so much to discuss its results as to demonstrate a medical communication research design using Big Data. It shows just how differently data has begun to be retrieved, prepared, analyzed, and interpreted within Big Data research. This example also supports the fundamental notion that medical communication content analysis at the Big Data level holds fascinating possibilities for better understanding and development of these medical relationships. Through collaborative efforts between medical and communication scholars, discoveries such as these may lead to the most important goal of EHRs, which is to improve the health and well-being of patients.

The Raw Data

This research segment represents only part of a much larger preliminary study conducted on the very same UPMC Montefiore Hospital Internal Medicine patients and physicians who interacted online using the Medical Advice link of the HealthTrak system during the same period of January 2, 2006, through April 15, 2010 (discussed in chapter 5). During this period, 57,335 separate messages were exchanged with 39,615 (96%) initiated by patients and 17,720 (31%) initiated by physicians.[14] There were 42 physicians and over 23,000 patients who produced these messages during this time (a larger number than what was actually surveyed due to availability, attrition, etc.).[15] All messages were drawn from the patient's electronic medical charts taken from the secured portal of HealthTrak. Of the 57,335 messages exchanged, a total of 16,996 actual transactions were examined (person A to person B then back again would equal one transaction or "turn").[16] Of these messages, only those that contained a maximum of 210 words per message were used to eliminate the possibility of performing analyses on long lab reports or attachments that were not technically part of the dyadic conversation.[17]

The Theoretical Framework and Hypothesis Generation

As with any research project involving large data mining sets, this study began without any specific questions or hypotheses. A description of the physician/patient electronic messages was sought to determine what if anything could be learned about how words were used as the online relationship developed over time. I assumed that if physicians and patients really did develop an interpersonal online relationship, then there should be evidence of some sort of interactional change in how they communicated over the length of that shared transaction.

Theoretically, I conceptualized the online interaction between physicians and patients as it related to the Coordinated Management of Meaning (CMM) developed by Pearce and Cronen (*Communication, Action, and Meaning: The Creation of Social Realities*, 1980). This theory provided a foundation for perusing the data set. In brief, this theory states that when people interact, they negotiate meaning through social constructs (words) which facilitate communication understanding or "meaning-making." This is a "Rules-Based Theory" in which two people, over time, construct shared meaning as the conversation develops. Words themselves take on specialized, shared meaning for the dyad the longer and more frequently the interaction continues. I thought that online communication would be particularly appropriate for this theory in that the "types" of different words used could be easily identified by the computer through word "dictionaries." As patients and physicians communicated, it would be possible to see how patterns of word sharing changed over time. I assumed that the two members of each dyad would start off with fewer similar words in common and over time would begin to use each other's words. An example of this would be a physician using medical terminology that the patient then learned and used. The physician might also begin to pick up nuanced words or usages that the patient started with in an effort to adapt to the patient's conversation (as in using "gizzard" to refer to ones stomach).

It is to be noted that the specific application of this theory was not determined until after the data was perused and studied through variations of an original computer program. At first, it was an idea that made sense based upon the theory; later, as more information was uncovered through program creation and analysis, I began to generate hypotheses about the data. This is typical of the layered discovery process of data mining research.[18]

To test this theory, a lexical analysis was used based upon type/token ratios (TTRs). This method examines how many different words are used at each point of the conversation and to see how the words begin to be shared by the interactants over time. The underlying assumption of my research project was that as patients and physicians exchanged electronic messages, they would begin to share the use of similar words and terminologies. The "Ratio" (TTR) equals the number of unique words (Types) divided by the total number of words (Tokens).[19] One general assumption of this method is that emotional language has a lower TTR than intellectual language. "Yes, yes, yes!" would have a TTR of 1/3=.3, while "Yes, I understand." would have a TTR of 3/3=1. "Intelligent" conversation (reflecting higher readability scores if in print) is represented by a TTR equal or closer to 1.

Any assumptions concerning interpretation of the TTR results, needed to be tested by always going back to the original data. This cyclical, iterative process of testing and retesting of the assumptions with the basic goal of each TTR analysis helped to provide a quantifiable estimate of one aspect of each person's speech that could be used as a firm and objectively verifiable basis for comparison.

Preparation of Data: Deidentification and Dictionaries

Prior to beginning the analysis portion of this research, however, a great deal had to be done to prepare the data for use. This is the part of the process that is often overlooked by those choosing to do computer analysis as they often do not realize how laborious and time-consuming raw data preparation can be. Often, the focus tends to be on how fast the computer produces the output, but the program cannot produce anything without the data being prepared in a format that the computer can read.[20]

In the case of this study, the most important yet most difficult task was to deidentify the data. HIPAA and IRB regulations require that no identifiers such as names, places, or descriptors concerning the patient, physician, or anyone else can be present in the data. Therefore, before even allowing the computer analyst to work with this data, all words that could have been considered identifiers had to be eliminated. First, due to HIPAA regulations, a De-ID program was run on all the data before analysis. I then personally examined each individual, unique word contained within the data (including all misspellings, abbreviations, and actual words). I omitted anything that could have resembled an identifier that the computer program may have missed.[21] All words that appeared to be misspellings were also corrected.[22] Since many of the terms were medical, I used medical dictionaries to check the spellings and then had an internal medicine physician review my list to make sure that I had the words spelled correctly. As with this entire process, there was considerable room for error with the only real check being to go back to the messages themselves in the data set.[23]

As I was making the deidentification, misspelling, and abbreviation corrections, I noticed patterns of words and categories visibly emerging from the data. After much discussion with my research team, I began to identify categories that suggested "dictionaries" of words that seemed to have similarities of meaning. Eventually, a total of thirty-nine categories were identified ranging from articles (to, at), courtesy terms (please and thank you), and question words (who, what, when, where, why, how) to various categories of medical jargon including diagnoses, treatments, symptoms, medical abbreviations, and pain. These dictionaries provided the categories for potential classification of types of words used. For example, I thought that males or females might use different types of words (just as males and females, for instance, differ in the use of explanation points where of the 38% of messages that contained them, 84% of these were used by females and only 16% by males), pronoun use might change over time (going from "I" to "we" perhaps), or medical jargon terms might be used more frequently as patients learn the terms. Once such clusters were found in the data set and these dictionaries were developed, an endless variety of hypotheses could be tested as one correlation of variables lead to the next. The difference between this kind of Big Data analysis and the hypothesis generation in much other research, however, is that the *entire process is iterative*. As one question is answered, the next emerges in the process of becoming closer and closer to interpreting the meaning inherent in the data. The same data set can be used repeatedly to uncover more and more information about a set of interactions.

Initially, it was hoped that each word within the dictionary could be exclusively categorized in only one place. However, after further analyzing the data, some words seemed to overlap categories. This suggested that a topography of relationships existed between the various categories of the words used within the data set indicating some word sharing or overlap. Such visual displays of data are now possible in other computer languages. These are based upon frequency of words visually clustered together. My program and study, however, additionally showed the overlapping relationships between the dictionaries of words in addition to the frequencies of their use.

In short, this phase of the analysis revealed that the dictionaries alone and the potential topographies provided a wealth of information about the types of words used within the medical interactions. This phase, however, did not reveal how word sharing changed over time as the relationship developed.

Relational Computations: A Lexical Analysis

Once the data was deidentified and fully prepared into dictionaries, a wide variety of computations was performed. This study examined TTRs. As explained above, basic TTRs are said to determine the readability, intelligence, and emotional content of an interaction. To examine how these TTRs might reveal relational development, a computer program was designed that could string together the individual threads of conversation for each dyad and then determine whether these threads showed any increase in word sharing (the CMM or Coordinated Management of Meaning).[24]

This time, in addition to the single TTRs of each “stroke” of interaction (with the patient to physician, single electronic message being one stroke), the Dyadic TTRs (DTTRs) were calculated for each physician/patient pair. This showed the overall characteristics of each dyad and could potentially help to describe how each physician might vary in his or her overall interactions with patients. That is, one physician’s overall DTTR might typically show a lower TTR (i.e., fewer different words used, less intelligent content, more emotional) when dealing with patients while another physician might show a higher overall DTTR (i.e., more different words used, more intelligent content, less emotional).

Beyond this, two additional calculations were run. The Sequential TTRs (TTRSs) were calculations on the conversations, transaction by transaction, with the purpose of examining the *process* of these conversations. The Cumulative TTRs (TTRCs) were calculated on the conversations as they developed or changed over time. With the TTRCs, transaction one is added to transaction 2 and so on. If a patient says one thing and the physician another, they are not sharing meaning. Based upon CCM, at first patients and physicians should have a higher DTTR since they both use many different words, but as they communicate over time, there should be more sharing (repeating of words) and therefore a lowering of TTRs. A higher TTR (closer to one) shows a lack of shared words and a lower TTR (<1) shows more sharing of words. By running calculations on each physician/patient dyad and comparing the various TTR scores a massive report was created that showed that overall communication did indeed seem to change over the duration of the interaction.

The initial calculations of all TTRs including individual, Dyadic, Sequential, and Cumulative, created an excel chart with 20,000 rows by 600 columns. Indeed, it takes a computer to produce this much information and a computer analyst to interpret such results. This is a totally different sort of computational output than those in the days of Snow and Nightingale.

Beyond these results, however, what was most interesting was to identify what individual physician dyad characteristics were like for those who were listed as the outliers (as determined through Z-score computations). That is, outliers were those physicians and patients who appeared to show the greatest change in adaptation over time and those who showed the least amount of change.[25] Once these were identified, the next step was then to return to the actual threads of communication, the raw data itself, to look at what might be the reason for these particular physicians and patients to be showing such marked differences in TTR scores—particularly the CTTRs, which showed change over time.

In looking at the raw data for the individual outliers, questions were asked: Who were these outliers? Might there be any demographic information on any of these that might suggest these differences?[26] How many outliers were there? What made their conversations so different from others? What might the cause of this difference be? How might one describe the transactions as being unique or outstandingly different? This process of going back to the data involves what some might call “getting dirty with the data.” Again, many people think that data mining means the computer does all the work, the computer analyst does all the computations, and the researcher simply reports on the results. This, however, is not the case. The human element remains important not only in the process of deidentifying and preparing the data, but also in the end when the raw data needs to be reexamined and tested to help determine the *meaning* of the results.[27]

Results and Applications to Future Research

With nearly 60,000 messages transmitted over a four-year period in a major research hospital environment, this data set certainly could continue producing much information for years to come—especially if it were to be compared to other similar data sets from different hospitals or different time periods. The possibilities for continued analysis of this data set are endless. In fact, due to current data storage potential, this data remains valid and usable for a wide variety of comparative future research.

In brief, results from this preliminary analysis showed that those physicians who were outliers in their TTRC (indicating more shared use of words and, according to CMM, shared meaning) had notable qualitative characteristics in common. The raw data set suggested that these individuals tended to write messages with more words of clarification, medication explanation, assurance, apology, information seeking, and information giving. They also tended more often to discuss lab reports, suggest referrals to other physicians, and note new items of concern ("Please come in to see me due to…."). The descriptive style of the language was less formal, more misspellings appeared, more abbreviations were used (such as "pls" for "please"), and more signs of first name or initial usage occurred ("Jim" as opposed to "Dr. Jones."). The patients in these same dyads also seemed to use more medical jargon, suggesting that they more readily adapted to the physician's language as well. These qualitative findings suggest areas that could additionally be explored and tested in future analysis and hypothesis generation and retesting.

As stated earlier, the process is iterative. The data set is quite large and quite rich in content. What would be very interesting would be to couple the results of this research with additional sets of data. First, it would be interesting to look at UPMC Montefiore Hospital's Internal Medicine program group today, after this system has been in use for nearly ten years. It would be interesting to check to see not only how physicians and patients might currently respond to surveys similar to the ones used in chapters 4 and 5 but also how they might change in their use and perceptions of the medium itself. Running new TTRs for the new users and, if possible, even comparing them to the ones who have been using the system for the past decade, might prove informative, especially if the dyad might have remained the same over time (same physician and patient). It would likewise be very interesting to compare how the rural Johnstown might compare to the urban Pittsburgh hospital in usage patterns and TTR analysis. Would "new" system users be similar or markedly different? If the UPMC users from 2006 are similar in nature to the new users in rural areas, then the inexperience of the users themselves in communicating within a medical context such as the Medical Advice link might be the reason for the differences between urban and rural EHR use noted in the previous chapters. Obtaining the data, comparing it, and drawing conclusions may face issues of different computer programs or different formatting of data, but even samples of raw data with qualitative comparisons would be interesting (such as random samples of actual transactions at the beginning, middle, and end of the thread of communication).

Whatever the case, this example of using data mining to examine large data sets is a challenging process yet a rewarding means for learning about medical online relationship development. Likewise, observing interactions themselves demonstrates that this online communication does seem to be efficacious in that those who use it the most and do so in an outstandingly effective manner (as represented by change in shared meaning over time) do in fact show that online electronic messaging can indeed help develop medical relationships—judged by shared vocabularies—and ultimately work toward saving lives.

Natural Language Programming

The complexity and detail of this preliminary study was great in that it required not only the standard deidentification, input, and analysis of a massive data set but also the development of an independent computer program. Interpretation and analytics are extremely important when conducting Big Data research because without the team effort of multidisciplinary expertise, the results may be inconclusive or at best, inadequately analyzed for contributions to the overall knowledge about electronic medical communication. This program was specifically developed for this type of linguistic analysis, which meant it was designed for only this specific type of research.

Today, with the availability of so many programs that are designed to be more user-friendly, the ability to create such a specialized single program to do specific calculations is for the most part, unnecessary. At the time of my initial research, my fellow researchers and I were not aware of any Natural Language Programming (NLP) that examined the patterns of the words themselves and how they could be lexically analyzed over time. Consequently, a brand-new program that met the iterative testing needs of this ongoing project was developed. Other options may be available now to approach this same data set from a similar yet equally unique perspective.[28] Whichever NLP program is selected, the key is that it processes the medical data in a way that is meaningful to both the researcher and to our understanding of patient/physician communication.[29] Without question, this type of research necessitates a "team effort" with experts in analytics, statistics, and the field of research itself such as in this case, medicine, communication, and linguistics.

Expanding Data Mining Research in Healthcare

As data volume and access increase improved analytical programming, new pattern recognition, and the overall, iterative discovery process, it must be noted that more and more data do not necessarily lead to improved health outcomes. Saving lives, improving health satisfaction, and allowing for a more efficient healthcare system are all possible; however, success depends upon effective manipulation and organization of the data through computer program analysis.

For instance, according to Remy et al. (2018), data mining of open-source health information can reduce the risk of incorrect diagnoses and lead to improved outcomes by utilizing physicians from a wide range of disciplines to facilitate the identification and cause of the patient problems. This predictive model describes "the relationship between the perspective of a good diagnosis provided by a physician and a patient's profile," thus improving outcomes and ultimately saving lives.

Other examples of data mining results include identifying student drug-use motives for predictive and preventative purposes (Jemenez, 2018), utilizing of significant risk factors to predict heart disease (Amin, 2019; Ilayaraja & Meyyappan, 2015), and determining whether a patient should or should not be operated on for the same problem more than once (Peixoto et al., 2017). As more information is gathered, patterns are identified, and predictions are made. The key is how efficiently, effectively, ethically, and accurately this information is used.

Online Messaging in EHRs and the Medical Relationship

Although this plethora of data has resulted in much research, the volume increase can be helpful but also overwhelming, especially to the naked eye. An earlier report showed that 41% of health executives say that their volume of data has jumped by 50% compared with only one year prior (McCann, 2015). When considering that most practitioners do not get involved with big data analytics and computer programming, this increase has often led to information overload. Information is generated from various areas of the EHR programs, pregenerated templates of physician reports (such as standardized summary letters for more than one patient from the same specialist), and personalized patient telemedical devices/apps used with glucometers, exercise monitors, daily food intake recording devices, and the like. This information overload for healthcare professionals (not to mention patients) can be challenging, time consuming, and even distracting. The point is, Big Data can be managed by computer programs, but it cannot be as easily managed on a day-to-day basis with the naked eye. There are definite pluses and minuses when it comes to all this information—some more critical to patient care and emergency situations than others.

This segment has demonstrated how computer programs provide the means for analyzing the huge data sets produced by EHR systems. This example of content analysis additionally shows that the medical eMessaging can provide information not only about health but also about physician/patient relational development. It demonstrates how well this medium facilitates safe, secure, low-risk, and effective medical care of the patient through shared decision-making. It contributes to new perspectives on how health and the medical relationships are viewed and suggests the potential value of the paradigm shift in medical research due in large part to the massive data sets enabled by the technology of EHRs and secured messaging portals.

SHIFT IN PRIVACY CONCERNS WITH INCREASED USAGE

As patients become more and more actively involved with their medical charts, the demand for constant, shared access will likely increase. Now, for instance, patients are being encouraged to try the Medical Advice link in the UPMC secured portal (currently rebranded as “MyUPMC”). They are being sent messages that alert them to changes in their charts such as new physicians’ orders, the posting of recent lab reports, and prescription updates. The reason for this, in part, is to get patients to become better informed and more involved with their own care.

The economic reason, however, is to prove to the insurance companies, the government, healthcare institutions, and, ultimately, the public that the early initiatives of the HITECH Act of 2009 as well as newly developed incentive programs are working toward improved use and functionality of EHRs, eMessaging, and, ultimately, patient care. As previously stated, Merit-Based Incentive Programs (MIPS) have currently streamlined three historical Medicare programs into a single-payment program for new incentive programs: The Physician Quality Reporting System (PQRS), the Value-based Payment Modifier (VM) Program and the Medicare EHR Incentive Program (Meaningful Use).[30] As throughout the years following the HITECH Act, changes continue to occur as programs become refined, new problems are addressed, and patient care ideally becomes the ultimate focus.

Such motivators may be morally driven by those who believe patients should have the right to be involved and act as their own advocates, but economic motivators also play a role in getting the healthcare workers, in turn, to encourage the patient users so that the system begins to “pay for itself” in upfront and management costs. The economic side without question drives participation forward (perhaps even more than the “patients’ rights” side). It is hoped that improved usage and health benefits will continue once physicians more effectively engage with the system and once patients become increasingly better accustomed to navigating health portals, uploading personal medical data through eMessaging services, and communicating through the use of developing technologies, Internet access, and patient education.

At the same time, with increased use and access by patients and physicians alike comes the risk of health information falling into the hands of an unauthorized party. Safeguards must be put in place not only by the institutions and physicians' offices but also by the vendors who supply and manage EHR systems. All devices (especially personal mobile ones) that access the portal also need to be protected from security breaches as well. Security has become a very serious and real issue surrounding the active use of EHRs. With more and more patients gaining access, sending electronic messages concerning their health, and even making corrections within the charts,[31] the possibility of someone seeing something they are not supposed to, increases as well.

Data Privacy and Access Issues

If a system does not maintain standards of care, it cannot provide safe, effective health services for its members. Patient privacy and security is paramount in all aspects of the medical profession including but not limited to the professional integrity of online electronic messaging. Protecting this space necessitates privacy guidelines and standards of care that are followed, managed, tested, reassessed, and readapted to the ever-changing nature of the healthcare system and technology. At the center of this concern is the EHRs' ability to store all aspects of a person's health record, including the messages exchanged with the provider online and including a wide range of demographic and personal identifiers (such as addresses, social security numbers, and even credit card information) . Throughout this book, repeated references have been made to policies and laws established, enforced, and overseen by the government that affect hospital systems, medical practices, individual healthcare workers, and the patients themselves. As shown in chapter 2, many policies help to regulate this system and assure that check and balance measures are constantly being taken to adapt to the changing environment in a manner that maintains the quality of care and the safety of all participants.

EHR systems have directly affected the healthcare profession, quality care, and security throughout the country. They are responsible for storing, managing, and facilitating communication involving the patients' private information.[32] Monitoring the very essence of the patients' records are the laws relating to the HIPAA Act of 1996 (104th Congress), a document representative of significant foresight in its thoroughness in outlining policies that clearly cover all aspects of patient privacy—even those involving advanced mobile technology and information exchange.

Additionally, electronic messaging and record-keeping is "The Standards for Privacy of Individually Identifiable Health Information" (2000), simply called, the "Privacy Rule." This document, written and approved well before the requirements of the Stages of Meaningful Use and the HITEACH Act of

2009, governs all aspects of privacy having to do with who has the right to view the records, how and when records may be shared, and how this information must be stored. Even when messages are stored and exchanged within a different medium (from paper to electronic chart or from oral conversation to electronic messaging), the same standards of care and privacy apply.

In particular, the Privacy Rule explicitly states that patients have the right to review all aspects of their charts and to request a copy of them—except in the case of records involving psychotherapeutic care. In this instance, it is argued that, for the health and privacy of the patient, these notes must be kept in a separate file from the main chart and must not be permitted to be shared with other professionals or insurance companies without the patients' approval. Because of these safeguards, this information is more protected, yet remains in the electronic chart under protected mode (without the patients' or others' ability to see it).[33]

Some feel that even this data needs to be shared with patients (Warner & Warner, 2015) even though heretofore any information that the physician or healthcare provider might deem physically or mentally harmful could be "hidden" from the patient. This criteria, of course, can be quite loosely applied; and, so, historically, many physicians chose not to allow patient access to their records at all.[34] Now that the OpenNotes projects of the Robert Wood Johnson Foundation have explored the positive effects of online electronic charts and data sharing with patients, the rules surrounding the arguably loose definition of "serious harm" have been challenged (Robert Wood Johnson Foundation, 2013).[35] This ongoing, grant-related series of research projects overall have asserted that patients want and benefit from full access to their medical records. They not only can (and should) know what is going on with their own health, but they subsequently become more active participants in their healthcare management. This in turn allows them to "catch" mistakes in their charts and to respond to them as they deem necessary through electronic messaging directly through the secured portal. This response pattern is in full adherence to the Privacy Policy, and is an excellent check and balance system for the reduction of medical errors.

By allowing patients to read their own charts, respond directly through the secured portal through electronic messaging, and participate in the accuracy of their own records, the EHR medium provides the means for full patient involvement and patient responsibility. Privacy and accessibility are guided and protected by governmental standards of care.

Interoperability Issues

If the patients' right to read their medical charts is considered a law, then why not allow them to access their medical information from a centrally organized location or link? Why not allow *all* their personal healthcare providers—no matter where they go for their health services—to also have immediate access to this data, especially if they give permission to their providers to gain this access? If patients technically "own" their own medical history, why do they have to pay for access to their records? How many patients even realize that hidden in their healthcare costs are fees for such services?[36]

These and other such concerns have become central in discussions surrounding access to health data and electronic chart ownership. One of the key objectives of the HITECH Act of 2009 was to allow for interoperable access to patient charts no matter where in the country (or world for that matter) they sought medical care, so long as there was Internet access to the patient's medical records. This objective, however, has not been reached even today and possibly will not be reached in the foreseeable future. Patients find it difficult to access their medical information due to controls placed on the information by systems that monitor EHRs, namely the built-in software mechanisms that "protect" the patient's information—even from the patient or any other healthcare provider who needs access to critical and timely documentation. This becomes a problem, especially when patients are seen at multiple locations by physicians and healthcare facilities that operate using different EHR vendors. Even if the system allows access to the patient, often the patient must have a variety of passwords and is charged internal and often hidden operational fees by each of the different vendors when information is shared between systems.

This remains a central problem that needs to be resolved. By March 30, 2015, the Federal Register (Department of Health and Human Services: Centers for Medicare and Medicaid Services) stated that all systems would be expected to achieve interoperability or eventually be penalized through the government reimbursement system.[37] This, however, did not happen. Forcing this change through mandates provided motivation but addressed only half the problem. The fact is, systems are still not interoperable partly because of the technological challenges and lack of interface capabilities but even more so because EHR vendors perhaps do not *want* to be interoperable. For some of the larger EHR companies, this may be a way of controlling or even monopolizing the system.

This problem is reminiscent of the transition period of another communication medium's adoption from the early 1900s, involving similar control issues until laws forced equal technological interfacing. During World War I, the Marconi Company introduced the nonintercommunication policy, attempting to monopolize interconnectivity of radio stations aboard commercial and naval vessels (Douglas, 1987; Headrick, 1991).[38] The company claimed that their apparatuses were incompatible with those created by other companies and thus had a policy of not communicating with those other apparatuses. Once it was shown that rival communication apparatuses were, in fact, quite compatible and reliable, the Radio Act of 1912 challenged this monopoly and allowed for freedom of use within the system as discussed in full in the Hearings before the Committee on the Merchant Marine and Fisheries (1917). Fascinatingly, this shows that emerging technologies or mediums of the past faced much of the same conflicts and challenges as those of the present. Perhaps too, something can be learned from the process of not allowing monopolies or control from one or more vendors.

To accomplish this, technical-sharing issues surrounding various EHR systems continue to face considerable work before universal formats can allow for full interoperability between systems. At least this was part of the vision of the HITECH Act of 2009. Over the past number of years, one of the largest and most influential of all EHR systems has been Epic (which was mentioned earlier as it is the one used by UPMC at the time of the cited research studies herein). On March 17, 2015, law officials met for a full committee hearing on "America's Health IT Transformation: Translating the Promise of Electronic Health Records into Better Care" (U.S. Senate Committee on Health, Education, Labor & Pensions). At this time, Robert Wergin, president of the American Academy of Family Physicians argued, "The vendors are siloed and you're held somewhat hostage by the vendor you have. It becomes difficult to change." This monopoly seemed to be the theme of this meeting as many articulated their frustration with the unwillingness of companies such as Epic to compromise and "share" services without charging operational fees.

According to Conn (2015), Epic and other top EHR vendors eventually responded to pressure and agreed to waive their "record-sharing fees" (again similar to the days of Marconi) after "years of saddling their customers and outside firms with substantial fees for interfaces and other costs for interoperability . . . vendors . . . are now engaged in what looks like an interoperability price war." For instance, according to Epic's CEO, Judy Faulkner, Epic customers had been regularly charged for sending clinical messages to a health information exchange at the amount of 20 cents each, while inbound messages from a non-Epic user cost $2.35 for that patient for a year, no matter how many messages were sent (Conn, 2015). By April 2015, in response to complaints (Caspi, 2015), a number of EHR vendors including Epic announced that they were waiving their data-sharing fees entirely in an effort to show their commitment toward interoperability (and possibly to appease the accusations of creating "roadblocks" for data access).

Moving forward, it appears that the only real solution would be to have stiff penalties for interoperability restrictions, fees, and/or violations. Tahir (2015) stated that as of January 2018, all EHR vendors would have to attest that their software was in compliance with interoperability provisions or face significant penalties if they do not provide data sharing. This was also stated in the 21st Century Cures Act, which was the legislation developed by the House Energy & Commerce Committee to facilitate medical technology and biomedical innovation (2015). The challenge has continued to be how well these regulations rectify this complex issue surrounding interoperability.

Some have argued (Caspi, 2015) that interoperability could be achieved through a standardization of application programming interfaces (APIs) that would allow for a set of protocols and tools for software applications. Earlier, in Stage Three Meaningful Use, it was proposed that APIs could require patients to login with one set of credentials that allowed them to retrieve and interact with (e.g., by attaching electronic messages that correct select information on the charts) their medical health information and use it in whatever way they needed to for their own health purposes. Instead of having to get separate approvals from various EHR vendors and health system users, only one line of access would be provided. The idea seemed to remove the "IT bottleneck," but the universal use of API frameworks remained a long time in coming. It was believed that control over EHR interoperability needed first to be centralized, out of the hands of monopolizing systems, and then the information technology personnel needed to develop interoperability mechanisms such as the API framework that could allow such universal access. Unfortunately, closure to this problem remains a long way off.

Around the time of this publication, Centers for Medicare & Medicaid Services announced the following concerning EHR technology:

> Beginning in 2019, all eligible professionals (EPs), eligible hospitals, dual-eligible hospitals, and critical access hospitals (CAHs) are required to use 2015 edition certified electronic health record technology (CEHRT) to meet the requirements of the Promoting Interoperability Program. Note that the requirements for eligible hospitals, dual-eligible hospitals, and CAHs that submit an attestation to CMS under the Medicare Promoting Interoperability Program were updated in the 2019 IPPS final rule. In 2019, all Medicaid eligible hospitals and EPs must adhere to the requirements of their state's Medicaid Promoting Interoperability Program and attest directly to their state. Visit the 2019 Promoting Interoperability Medicaid page for more information. (CMS, 2019)

This statement from the government, though a beginning, has not yet enabled EHR systems to become any more universal or interoperable.

As of 2019, there remain many different EHR systems, though monopolies have surfaced with Epic currently the largest one with 33% of the market, Cerner with 28%, Meditech with 16%, Allscripts with 5%, MeKesson with 4%, and all others totaling the remaining 14% (Newman, 2019). Although over 95% of the hospitals and 90% of the office-based physician practices have currently converted to EHRs (Office of the National Coordinator for Health Information Technology, 2019), electronic data silos continue to exist with little hope toward the goal of interoperability due to not enough patient identification across Health Information Exchanges, minimal participation in data sharing by those who own the data, high operational costs, and lack of communication standards between various EHR systems (Barrick, 2019).

Nevertheless, Pew reports have indicated that we are at least getting closer to the goal of interoperability (Mascovitch, 2019). The Office of the National Coordinator for Health Information Technology (ONC)—the federal agency that oversees EHRs—continues to address issues that might help bring this into reality as a result of a 2019 bipartisan mandate made by Congress reexamining elements of the 21st Century Cures Act (Cures) and potentially cooperating with the Centers for Medicare and Medicaid Services to create additional, more powerful incentives.

The medium of EHRs has provided much hope and many benefits for the future of physician/patient interaction and information sharing, but the process of overcoming the many changes and challenges inherent in this medium may be a long time in coming.

Security Issues: Information Breaches, the Cloud, and Blockchain

In and of itself, interoperability sounds like an important and necessary goal for the future of EHRs and healthcare itself. The Privacy Rule states that patients not only have the right to view their own records but also have the responsibility to review them, understand them, and note potential errors within them. HIPAA laws govern the protection of data. Physician teams who care for individual patients across states and even continents should be allowed to view patient records if the patient gives the permission for them to do so. Repetitive tests should not be done every time a patient sees a different physician within a different healthcare system. Results should be made easily available without wasting precious time trying to locate past records. Everything should be as instant as possible, as accessible as possible, and even as measurable as possible (in the case of data mining).

In a perfect world, this sounds like the best-case scenario. However, despite laws being in place to protect the security of information, such sharing and access has opened the doors for serious breaches of healthcare information. Early on this fear surfaced as Ponemon Institute (2014) predicted that the cost of breaches could reach as much as $5.6 billion annually. A year later, Experian (Experian Data Breach Resolution, 2015) reported that medical record breaches occurred for 4.5 million patients from 206 hospitals across twenty-three states, and this represented only 42% of the major breaches reported according to the Identity Theft Resource Center. Recently, the Protenus Breach Barometer (2019) reported a still more massive increase of data breaches with over fifteen million patient records affected. Although each of these reports come from different research institutions with potentially different controls, one could surmise that within a three-year period, the number of affected patients more than tripled.

Today, Experian Breach Resolution (2019) indicates that elements of intentional information theft as well as unintentional professional carelessness combine to make the ideal of interoperability and sharing a seemingly unattainable feat. Experian states that the top five issues that prevent the security of health data involve biometrics, skimming, wireless carrier attacks, and cloud misconfigurations. Ever since medical records have gone online, an increased concern for the security of health data has rightfully emerged. Recognizing the seriousness of this problem does not eliminate it, but it at least helps to keep users (practitioners and patients alike) aware of the risks involved.

Certainly, credit card breaches such as those connected with Target and Home Depot in past years have concerned people and have made them increasingly more aware of how online information can be compromised. With a credit card company, however, the accounts may simply be closed, but with medical records, not only credit card numbers but social security numbers, dates of birth, addresses, and identifying health records from decades past can all be stolen (Ornstein, 2015). In effect, the entire person's identity is compromised, a concern of immeasurable proportion.

Healthcare information theft is real and even more compounded with data stored in the cloud and accessible not only with a password but also with personal mobile devices that often "remember" the password, making theft of the device commensurate in measure to handing out a number of passwords.[39] With so many points of access requiring passwords whose systems also force frequent password changes, it is not a wonder that people opt for their mobile device to "remember" the various passwords, unknowingly providing anyone who accesses that device all of that person's information. If the person is a medical professional such as a physician, that device could provide access to personal information not only of the physician but also of hundreds of users connected to the systems that are accessed by that device.

Beyond intentional hackers, privacy today is often even further compromised by unknowing healthcare professionals who access information from the convenience of their mobile devices without concern for encryption of messages or Virtual Private Network (VPN) added security. Hospital systems are likewise at fault as they often do not adequately educate their staff members nor provide them with better security options (such as mandatory VPN security). Physicians and healthcare workers alike often use their unprotected, unencrypted mobile devices to communicate eMessages (such as text messages) concerning patient private information between staff members, fellow physicians, medical students, and even patients without considering that their device could be hacked or even just found in the wrong person's hands.

A specific example clarifies this point: Gruessner (2015) noted that the BYOD, or "Bring Your Own Device," movement had increased the security challenges with medical professionals who were no longer being provided a mobile phone or computer by the healthcare facility. Rather, the facility allowed personnel to access information on their "own device." This may have saved the healthcare system a great deal of money up front, but the lack of security associated with these devices is almost insurmountable. It is recommended that healthcare organizations create a register of all connected devices which means that the IT departments of hospitals would be able to detect all unauthorized devices that could suggest security concerns (Gruessner, 2015). This means that all smart phones, tablets, or any device that can connect to the Internet would have to be registered, tracked, and secured with its own VPN setup. What is frightening from a security standpoint is that very few hospitals (let alone smaller medical offices) were following this practice, partly because it was not mandated, partly because of costs, and partly because of sheer ignorance of the magnitude of security problems that unprotected devices bring into play. As Susan McAndrew, Office for Civil Rights (OCR)'s deputy director of Health Information Privacy stated, "This is just common IT stuff." She had little sympathy for HIPAA transgressors, adding that stiff penalties could be avoided by simply "(paying) attention to details" (Gruessner, 2015).

Fortunately, since 2015, great strides have been made toward health security concerning the BYOD phenomenon. According to a 2018 market intelligence report, "90% of hospitals surveyed have made or are planning significant investments in Smartphones and secure unified communications" (Spyglass Consulting Group, 2018). The report cites reasons for this transition away from BYOD devices including communication overload (overhead pages, multiple text, and phone interruptions, etc.), dissatisfaction with existing communication tools (antiquated hospital IT devices that are not adequately integrated with EHR systems), and lack of standardized procedures (due in part to the rapidly changing technology and associated problems that were not predicted).

Since EHRs are safeguarded by secured portals which are password protected, eMessaging within these portals is relatively safe. However, when one considers how often the Internet is accessed through non-VPN protected mobile devices and how easily passwords may access data stored on the Cloud, the reality of how serious security breaches may become is almost unfathomable. In response, "blockchain" technology has increased in popularity as a potential means for securing EHR information already stored on the Cloud or on separate servers. The blockchain is "the 'ledger' that all bitcoin [a type of encrypted digital currency] transactions are recorded on" (Tatar, 2015). If applied to EHRs, this permanent ledger-keeping capability could allow for a much more secured mechanism for recording and accessing private medical information. Each transaction (or entry into the EHR system), could be logged by the physicians involved in each patient's care. Patients could also access the ledger of all transactions; however, access to that log would be available only to those who have the personalized access code (the patients themselves or the physicians involved in the case). The blockchain, therefore, could provide a "decentralized and permanent record" for all transactions that take place within the EHR system, enabling it to be simultaneously both secure and accessible only to those who have the "key" for access. Since the information is stored in cyberspace (as much of the data produced by EHRs already is), the information could be accessed from virtually anywhere. The protected access points and the variable levels of access could potentially allow for more secured interoperability and active online communication (medical eMessaging).

Not surprisingly, the buzz over blockchain saving the healthcare system continues to garner attention. According to a Pew Charitable Trust Report (2019), healthcare management workers acknowledge the rising demand for accurate exchange of patient electronic records lending to the argument that the blockchain solution needs continued attention. Likewise, *Modern Healthcare* (Livingston, 2019) states that significant progress continues toward making this a reality. It perhaps is the answer to the seemingly unsurmountable data challenge that has both plagued and benefited the healthcare system. If in fact this effort is realized, the solution to interoperability as well as security will not depend upon the cooperation of individual vendors' but instead on the secured and independent blockchain solution. In *HealthManagement.org – The Journal*, Ricotta and Laidlaw (2019, issue 1 cover story) refer to 2019 as the year of the "Big Data Blockchain." Perhaps hope exists for fully secured interoperability of EHRs and accessible Big Data research in healthcare. Certainly, vigilance of security and privacy issues must continue. With each new advancement, unanticipated challenges are bound to surface. Nevertheless, the promise of the blockchain solution could facilitate the recording, storing, and retrieving of health data by ensuring that all electronic records—including eMessages, personalized data collection devices (such as phone apps), and EHR documentation—can be shared and retrieved in a secure yet accessible manner. So long as security and privacy issues remain in the forefront, blockchain may very well become the future of data collection, diagnosis, treatment, and ultimately saving lives.

THE MEDIUM'S MESSAGE IN THE MEDICOLOGICAL ENVIRONMENT

Privacy and interoperability issues are real. Solutions are not easy. Applications and adoptions of any new technological medium can elicit a multifaceted response: Both the excitement of anticipated benefits and the dreaded fear of the unknown. This is not to say that EHRs and eMessaging within secured health portals should be discarded or that advancements should in any way be slowed. On the contrary, this new medium should be used, expanded, supported, and respected within the medicological environment. The potential for communication, data mining research, and patient-centered, participatory care are all tremendous benefits of this medium. As with any "new" medium such as electricity, the radio, the TV, the telephone, or the Internet, the power of the medium lies within its potential and its far-reaching application in the future. The medicological environment thrives amid change. It embraces not only technology and health but all other interrelated and interlocking areas of law, politics, environment, economics, and society in general.

Is the medium the message as Marshall McLuhan so famously asserted? Or is the message the medium? That is, is the message something that we forget to pay attention to when a new medium is introduced? Are we too often caught up in the novelty of what the medium can do, how we can learn to use it to its fullest potential, how we can buy the most advanced largest (or smallest) version, or how we can "control" its manner of shaping society through laws, regulations, and mandates? Do we focus too much (or not enough) on the medium's ability to transform society and in this case transform the very face of healthcare? With transformations come an element of uncertainty, an aspect of fear, and yet the thrill of immersion into a new space that is forever changed and changing. Its driving force is something that we cannot necessarily control but perhaps can at least nudge forward while opening a safe, mindful path before it.

These questions may be troublesome, but they are not meant to be inhibiting. They are merely questions of caution. They are intended to cause us to take pause and not get too caught up in the process of learning how to navigate and use the new medium but rather to always remember and respect its far-reaching, transformative power. The medicological environment is a dynamic space where we can thrive by using the medium of eMessaging within secured health portals to enhance electronic record-keeping while facilitating and assuring our own health.

NOTES

1. In Geiger's review, he stated, "Mr. Starr limits 'medicine' to mean personal medical services and public health. His book, in consequence, is a history of medical care, not a history of health and disease in a political system that determines to a considerable degree who will suffer and who will be spared" (An Overdose of Power and Money, 1983).

2. Some may argue that even this has been changed. When medical visits are online and/or virtual, the lack of the physical presence of the physician and patient

indeed alters how medical decisions are made. In a sense, the lack of physical contact in EHRs and online communicating does affect the care of the patient.

3. These include the Liaison Committee on Medical Education (LCME) for accreditation of medical programs leading to the MD degree, the Commission on Osteopathic College Accreditation (COCA) for accreditation of programs leading to the DO degree, the Accreditation Council for Graduate Medical Education (ACGME) for accreditation of residency programs, the American Osteopathic Association (AOA) for the accreditation of postgraduate credits, and the United States Medical Licensing Examination (USMLE) for practice accreditation.

4. For an excellent example of such incorporation of STEAM into typically STEM programs, see the 2019 program of Morehouse School of Medicine in 2019 at https://www.msm.edu/Education/PipelinePrograms/STEAMacademy.php).

5. This program, started by Rita Charon, MD, PhD of Columbia, is discussed in more detail in the section on Narrative Medicine below.

6. As the former executive director of the Cambria-Somerset Council for the Education of Health Professionals, Inc., I witnessed significant change in the demand for educational programming at all levels of medical education. The inclusion of communication "tracks" within our conference programming was common largely because it appeared to be interesting to the participants (as attendance tended to be high when these tracks were offered), needed as part of their "safety and risk" educational requirements, and recognized by administrative personnel who reviewed their educational choices for accreditation.

7. In my medical communication class, for instance, I draw students from premedicine, pre-dentistry, pre-pharmacy, nursing, psychiatry, respiratory care, and communication alike. Without question, this study is interdisciplinary and is representing a significant change in how the fields participate and appreciate each other's research and approach to learning.

8. According to the AHIMA (Rules for Handling and Maintaining Metadata in the EHR, 2013), there are many categories of metadata: Application, Document, File System, and Embedded. The AHIMA defines each in a manner representative of the Sedona Conference (the Sedona Conference Glossary: E-Discovery & Digital Information Management, 2010) as follows: Application Metadata is data created by the application specific to the electronically stored information (ESI) being addressed, embedded in the file, and moved with the file when copied. Document Metadata are the properties about the file that are stored in the file as opposed to in the document itself. This includes such things as the document author, the creation date, or revision date as entered by the physician, patient, or healthcare user. File System Metadata are generated by the system to track the demographics that are stored externally from the ESI not embedded in the ESI. Embedded Metadata are generally hidden but are like "track changes" or "comments" that are part of the word processing or "notes" in a presentation file. This might be only available in the original, native file. This information may also be only found in the original file depending upon how the information is stored in the EHR.

9. This of course is how breaches have been identified in multiple high-profile cases and many minor ones throughout the country. If someone accesses the chart, it

is “seen” and recorded. Even a physician who accesses a patient chart that is not his or her own could be considered invading the privacy of that patient. It simply cannot be done by anyone. The record remains within the metadata and the possibility of someone finding out this breach is always there.

10. This is not meant to diminish the research of Snow and Nightingale. Their ability to identify patterns with the naked eye led to remarkable discoveries. It is difficult to surmise how their findings would have been uncovered and supported using computer analysis. The point is that how computers search for patterns is based upon the same method researchers have always used. The amount of data is different. The computers both create and cause the analysis challenges. Furthermore, the idea of “more data” does not necessarily mean “better data.” Computers simply facilitate the process in collecting and analyzing information. What researchers do with this information determines what sorts of discoveries might be made.

11. Of course, such methods are used in many areas besides medicine. The focus here, however, is on medical data mining and the use of data stored in EHRs.

12. There are in fact aspects of data mining that can be quite tedious including deidentification of data, word bank organization, and the like.

13. This became particularly evident in my own data mining analyses. I originally attempted to use SAS but could not find anyone who could interpret their programs. I was told personally by the chief executive of Finance of VISA Corporation, Wayne Best, that they used the SAS programs but only very few of their analysts could read and interpret SAS. Likewise, at UPMC, I found someone who used SAS, but they only read programs in their field of research. I identified SAS as a very powerful program, but could not identify anyone who could apply and interpret the results of that program. This was an unanticipated problem. I ended up using someone to develop his own in a language he was familiar enough with to use and run on my data. The point is that computer analysis may appear to be quite easy, but it requires a diverse number of specialists to work together not only to gather and collect the data, but also to identify or create appropriate programs in a language that someone can interpret and use in future analysis.

14. The reason for this distinction between physician versus patient initiation was to determine if both parties were starting threads of conversation or not. It was actually surprising to see how often physicians started the interactions, namely because this showed that they were not just responding to patient requests for information but they were purposely choosing to use the electronic messages to gain access to their patients instead of choosing to make a direct phone call or having the office staff contact the patient. This was considered elective usage. There could be some question concerning this conclusion, however, since physicians may have simply tried to use the medium to gain more experience or to meet Meaningful Use criteria. The latter, however, would not be the case since Stage Two Meaningful Use, which requires the online interaction with patients, was not yet in place even in April 2010.

15. Full IRB approval was gained through the University of Pittsburgh with the understanding that Fischer would be the primary investigator since he had access to this data as physician overseeing the program at Montefiore Hospital and also since he could assure full deidentification before anyone else studied the messages. All

data was stored on the UPMC servers and only a single computer in Fischer's private office was used to access the data until it was fully deidentified.

16. The determination of what is or is not an interaction was established because the intent was to observe change in interactions over time. To complete one interaction, a message was needed to be initiated by person A, responded to by person B, and then responded back to by person A again. This would be a complete transaction that would have the potential to show if there was any adaption to the other person's language pattern by the second response back by person A. Additional interactions back and forth would show more opportunity for language adaption.

17. After visual graphing of the length of transactions, it was identified that interactions seemed to level off at a maximum of 211 words per message. For instance, there were seven messages that were between 3,000 and 7,000 words. When the messages themselves were checked in the actual data set, it was found that they included attachments that were copy/pasted into the Medical Advice link. This tended to happen with the physician responses since they were not limited in number of words used as were patients within the HealthTrak Medical Advice link.

18. I compare this uncovering process to an onion skin. As one goes deeper toward the center, more and more is discovered. One cannot jump to the "center" of the onion because each piece must be peeled off and studied, one by one, before the next layer is understood enough to move deeper.

19. This method of analysis is typical of "readability" measurement for analyzing the "grade level" or complexity of a document.

20. Of course, the human element of raw data preparation also opens the door for human perceptual bias and human error as well. Not all aspects of data mining are without human intervention and interpretation.

21. For instance, I came across the word "white" often. I questioned this and realized that it was not a color but the name of one of the physicians in the practice who used Medical Advice. Because of this potential, I had to eliminate all use of "white" even if it might have referred to a color of a person's skin or complexion appearance. This was also true with abbreviations that could have been medial terms but also could have been references to locations or descriptors that could have referred to where someone lived. This was especially difficult and caused me to have to eliminate many words by hand until I felt that the word itself had no reference to any sort of personal identifier. I then had Fischer also review any questionable terms (such as the "white" example") until I felt the data was adequately cleansed. This process was multilayered and quite tedious, but it was necessary to guarantee any possible offense against HIPAA regulations.

22. This too was a difficult and challenging part of the process. For instance, just as Microsoft Word identifies misspellings and suggests possible corrections, my job was to attempt to consistently alter any words that were misspelled and reassign them accordingly. This certainly was wide open for error; so, I used suggestions from word banks and often went back to the actual text within the already partially deidentified messages. By now many of the sentences had words eliminated (deidentified) and respelled, making the text at times difficult to interpret. This process was certainly tedious and had a window of human error that could only be justified by the sheer

number of words that existed within the data set. That is, it was possible that I made mistakes but when dealing with these many words, it was assumed that they were minimal in comparison to the vast number of words used. The only real check and balance system was for me to go back into the actual messages to test to see if I had corrected the misspelling accurately. I could not physically do this every single time, but I did try to do it as frequently as possible. Again, the massive size of this data set and the difficulty in going back to the data itself as often as possible must be considered.

23. It is argued that spellcheck needed to be incorporated into the Medical Advice link at the time. This may have reduced error in interpretation of this raw data. If a medical dictionary was also part of this spellcheck, this may have encouraged patients to use the correct medical term, as many have close spellings or unusual spellings (such as Sjogren's syndrome that is pronounced "SHOW-grun" with "grun" rhyming with "sun"). This may have improved the accuracy for the patients in writing the messages, the physicians in interpreting them, and me as the researcher in trying to determine what the patient meant (without a medical degree).

24. One issue that may interfere with the results of this study is the fact that these physician and patient dyads did not only communicate online but rather did so in person at their medical visits. This means that the dyadic communication tested online may represent a change in the relationship of the physician and patient that has as much to do with the online interaction as it has with the in-person visits or even with telephone interactions. The computer analysis only factors in the thread of conversation that occurred online. This may mean that if any difference would be shown with the TTRs over time, it may have to do with all forms of interaction that occurred within the dyad and not necessarily just the online interactions.

25. Outliers could also be those who used the online communication the most and those who used it the least (only one interaction).

26. This question was impossible to assess because all identifiers were removed. (The only person who might have been able to shed light on the physicians would have been Fischer, but he would not and could not make comment due to HIPAA and IRB confidentiality regulations.)

27. In this case, Z scores and comparisons were run on both the Cumulative (ZTTRCs) and Sequential (ZTTRSs) as well as on the regular TTRCs and TTRSs. The results were statistically the same because the distribution of both were equal (as it should be). Such a comparative test was run simply to check for data consistency and accuracy of the program. It is to be noted that the TTRCs and the TTRSs can be examined for regular analysis of the content and coordinated meaning, but the ZTTRCs and the ZTTRSs can only be used for the outliers. Interestingly enough, the latter proved to be the most informative of all parts of this data analysis because they showed what the heavy users and the unusual users really were like. However, to interpret these results required going back to the raw data.

28. One of the most popular of these is the data analysis software called "R," a program that can be downloaded and used for free. Even the source code is open for inspection and modification if the language of "R" is familiar enough to the statisticians involved in the research. If it is not, an NLP tutorial and user blog is

available (Paruchuri, 2013). This program was first created by Ross Ihaka and Robert Gentleman at the University of Auckland in 1993 and now boasts project leadership including over twenty leading statisticians and computer scientist from around the world (Revolution Analytics). The most user-friendly aspect of this program is that functionality can be added to it by creating add-on "packages" for use by anyone who wishes to across the globe. These changes may then be used by anyone else who wishes to try them.

29. The computer must be programmed or "taught" how to look at the words in order to uncover the patterns and relationships that exist. The NLP algorithm must contain rules to govern how to sort the words automatically to identify what is to be uncovered (Richards, 2014). Looking up merely the word, "infected," for instance, is not enough because the words before and after that word in the medical notes help to explain the usage and meaning of that word. For instance, the physician might write "Is not infected" or "Infection treated successfully" as opposed to "has an infection" or "infection treated unsuccessfully." The computer itself cannot understand how the word order as well as the words before and after the key word, "infect," alter the meaning of the phrase. It only "sees" what it is trained to see. If the computer were only to search for the word "infect," without the words before and after the word, the meaning would be lost. It is important to realize these limitations not only in the program design but in the conclusions drawn from that program.

30. There are many types of "incentives" built into insurance company reimbursements. These may include but are not limited to how many patients who are sent home from the emergency room return for care within a certain period of time, how many high cost medications as opposed to generic or "recommended" medications are prescribed, how many expensive tests such as CT Scans are ordered in advance of less costly X-Rays, and so on. Indeed, the medicological environment is not just a place that serves the health of the patients; it is also a business with multiple "hands in the pot"—something physicians of the past were not used to. They now must know what is and is not covered by multiple insurance companies serving their patients in order that they get reimbursed and that patients do not get charged personal fees. The "outside" economic factors very much affect the "inside" decision-making of the physicians and the management of their practices.

31. Electronic charts that allow direct access to patients are never removed or totally changed by the patient. If a patient notes an error, for instance, they either send a medical message noting this error or they attach a note to the chart directly (depending upon the EHR system). When the message is noted, the physician or healthcare worker monitoring the chart receives an "alert" that the patient made a correction. The physician then must authorize this change in the chart by "signing off on it." This means that they verify the accuracy of the change, but the original error and patient comments all remain on the electronic chart forever.

32. This difference as discussed herein outlines the medicological environment within the United States, but there is certainly comparable change going on in the entire environment including what is happening in Europe. The National Health Service has issued concern about medical records being stored in regional data centers and has questioned "accredited safe havens" for recording of such things as smoking

and drinking habits and mental health conditions (Ramesh, 2014). The point is that this is not just a national change but a global one.

33. Some physicians who I interviewed and who did not wish to disclose their names told me that they never put everything in their charts, especially when it comes to mental health information that could harm the patient if someone found out about it. This may or may not be advised; but the point is that even in paper charts, this separateness of mental health issues exists. I do not feel it is quite as easy to be protected online even with special password protection. This, I believe is in the process of change as well. I feel mental health issues could still be written in separate areas as could be the patient's personal narratives; however, this information could clutter the basic health chart and would need to be able to be linked to for further explanation—even if that link were password protected.

34. Another area like the protection of "psychotherapeutic care" is the notion of the "parallel charts" discussed by Rita Charon, MD, PhD, who developed and manages the Narrative Medicine Program and graduate degree at Columbia University, New York, NY. Charon believes that patients' stories and even stories written about patients by their families, caretakers, or even physicians may be placed in a "parallel chart" which is separate from the actual medical chart (Charon, *Narrative Medicine: Honoring the Stories of Illness,* 2006). In March 2010 (Charon, An Oral History on Narrative Medicine, 2010), I did a series of oral history interviews with her at which time she explained to me that she no longer uses the parallel charts because they have become too cumbersome and are not working with electronic records. In contrast, I felt including these would make an excellent addition to the electronic chart since patients can now access and amend their own charts and since space is not an issue. She agreed that it was an interesting thought to place stories in a separate folder of the electronic chart, but she said that she had not really thought about it. She felt it might be a possibility with improved technology. She remained open to the idea and actually paused at length when I discussed it with her. I personally believe that so long as these narratives are protected as the psychotherapeutic materials are, there should be no reason that they cannot be in the electronic chart. Additionally, if a patient would choose to allow the stories to be visible to physicians, then that should also be their right which could be given officially with a signed consent form. Charon's other resources also discuss the idea of narrative, patient participation, and patient empowerment or advocacy (Charon, "Literature and Medicine: Origins and Destinies," 2000a; Charon, "Medicine, the Novel, and the Passage of Time," 2000b; Charon, "Narrative Medicine as Witness for the Self-Telling Body," 2009a; Charon, "Narrative Medicine: A Model for Empathy, Reflection, Profession, and Trust," 2001; Charon, "Narrative Medicine: Attention, Representation, Affiliation," 2005; Charon, "Narrative Medicine: Form, Function, and Ethics," 2001a; Charon, "Narrative and Medicine," 2004; Charon, "The Art of Medicine: Narrative Evidence Based Medicine," 2008; Charon, "The Polis of a Discursive Narrative Medicine," 2009b; Charon, "What to Do with Stories: The Science of Narrative Medicine," 2007).

35. As of 2015, over 19,000 patients in Boston, rural Pennsylvania (Geisinger Health System), and Seattle were provided access to their full medical records with 105 physicians agreeing to this patient right. Virtually all patients expressed that

they felt more in control of their healthcare, better informed of their medical issues, and more able to take properly the medications they were prescribed (Robert Wood Johnson Foundation, 2015).

36. Often patients are charged a per-page fee when requesting copies of their records to be sent to other offices or to legal counsel. At times these copies do not include all of the record, especially when the content could be harmful to the patient if shared directly with them (as in some psychiatric cases).

37. This is like what happened with Stages One and Two of Meaningful Use as discussed in chapter 2.

38. In the actual hearing, the chairman of the committee proposed, “If the Marconi Co., which is the strongest company existing to-date, and has more commercial stations, shall continue to develop, financially, as I hope it may, it can eventually shut out all competition by putting in stations and controlling rates” (Hearings before the Committee on the Merchant Marine and Fisheries, 1917, p. 258). This shows clearly how the company’s control was threatening the airwaves system and how it relates quite similarly to the controls such as Epic seem to subtly be placing on the EHR medium as well.

39. Stolen laptops in healthcare alone have added up to $2 million in fines for those who have not protected their own systems (Miliard M., 2015). Of course, again, this only represents those who have been caught.

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About the Author

Susan M. Wieczorek, PhD, is an associate professor of Communication at the University of Pittsburgh at Johnstown, where she teaches Medical Communication, Communication Capstone, Small Group Communication, Nonverbal Communication, and Public Speaking. She is also a Medical Interviewing and Advanced Medical Interviewing facilitator/preceptor at the University of Pittsburgh Medical School. She has published numerous articles and book chapters in the areas of Medical Communication and Media. In addition to a presentation for the Royal College of Physicians on Communication Technology in London, she has also spoken extensively at state, regional, national, and international conferences as well as Medical Residency Programs, Hospital Grand Rounds, and Medical Workshops in colleges and hospitals throughout the United States.

Susan brings to her work a unique perspective as ongoing administrator of her husband's family practice office (where she implemented the transition from paper to electronic charts) and as former executive director of the Cambria-Somerset Council for the Education of Health Professionals, Inc. She currently acts as coinvestigator with the WV Rural Emergency Trauma Institute on a data mining project involving 911 calls and child abuse. She also conducts research on simulated patients at the University of Pittsburgh Medical School with the goal of creating patient-centered, communication training programs. All in all, her expertise lies in her ability to recognize and promote the need for both the science and art of medicine in order to "save lives" and improve health outcomes.