AN EXPLORATORY STUDY ON PHYSICIAN/PATIENT ELECTRONIC MESSAGING WITHIN SECURED HEALTH PORTALS

by

Susan M. Wieczorek

Bachelor of Arts in Secondary Education/Speech Communication, University of Pittsburgh, 1980

Master of Arts in Rhetoric and Communication, University of Pittsburgh, 1984

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This dissertation was presented

by

Susan M. Wieczorek

It was defended on

September 21, 2015

and approved by

Gary S. Fischer, MD, Division of General Internal Medicine

John R. Lyne, PhD, Department of Communication and Bioethics Program

Ronald J. Zboray, PhD, Department of Communication

Dissertation Advisor: Brenton J. Malin, PhD, Department of Communication

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Susan M. Wieczorek, PhD

University of Pittsburgh, 2015

When the HITECH Act of 2009 set mandates for the transition from paper to electronic health records (EHRs), few realized the far-reaching impact this technological change would have on the entire healthcare environment. This dissertation examines the many facets of this adoption process by exploring perceptions, responses, and reactions of physicians and patients alike as they navigate through this transformative “medicological environment.” Characterized by influences from legal, political, governmental, medical, social, geographical, economic, and technological factors, this multi-faceted space reveals how a new medium for communication—the electronic message within secured health portals—transforms the way in which healthcare is managed and utilized today.

Multiple methods of observation, including oral histories, surveys, critical incident reports, and content analyses of data mined messages, together reveal the many challenges faced by patients and healthcare professionals alike as they attempt to adapt to this change while still maintaining (or improving upon) primary healthcare needs. As demonstrated by the varied responses from those living in rural and urban areas, it was found that each population approached the transition process from different vantage points. The early-adopting, urban physicians provided patient online communication simply because they felt patients expected it while rural physicians tended to resist the process, arguing that patients were media illiterate, lacked Internet access, and preferred face-to-face interactions. Others cited implementation costs

and personnel training issues as a deterring factor. This provides insight into how such a new medium can affect user perceptions about online healthcare, including physician availability, online relationship factors, and overall patient care. Future research suggestions include expanded content analyses of the electronic messages themselves and follow-up, longitudinal research once implementation is more widespread.

As the Institute of Medicine (2008) states, all patients have the right to varied means of communicating with their physicians, including but not limited to online interactions. Evidence of a paradigmatic shift exists in physician training as well as patient expectations. The influence of online communication within secured health portals certainly has contributed towards this shift as more personalized, patient-centered care becomes a vital part of this ever-changing medicological environment.

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1.0 THE PHYSICIAN/PATIENT ELECTRONIC MESSAGE: 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 amongst 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, an 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 socio-cultural 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 socio-cultural 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 sub-group uniquely and collectively responds to the mechanism of change, while simultaneously modifying and sustaining the dynamic "organismic whole" of society.[1] This

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[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

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. New mediums 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 the case of this dissertation, the medical arena.

Studying such a process not only allows for a deeper understanding of how something new is *introduced* into the socio-cultural fabric of an environment, but it 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 affects how change is implemented, managed, integrated, and sustained within the socio-cultural 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

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"socio-cultural 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.

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 dissertation examines the process of how one seemingly minor change—communicating online between physicians and patients within secured electronic health record portals—shifted the very essence of the medical relationship and healthcare in general.

1.1 INTRODUCING CHANGE IN THE HEALTHCARE INDUSTRY: MEDICAL SCIENCE AND TECHNOLOGY

Change itself is a constant in the healthcare arena. With a projected growth of 2.6% in the healthcare and social assistance sector, five million jobs are expected to be added to the United States economy between 2012 and 2022 in this area alone (Bureau of Labor Statistics, 2013). Of these jobs, telehealth services in 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 U.S. (Winfrey, 2015). The year 2015 has been declared "The Year of Healthcare for Wearables (Feibus, 2015), in reference not only to wristbands or ankle bands that monitor movement and exercise but to healthcare devises that monitor everything from blood glucose levels to blood pressure.[2] A more recent example of a wearable is Vida®, a phone app that pairs the wearer with his or her own personal "coach" (real or android) that helps monitor daily activities and provides assistance in the form of personal

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

training, nutrition plans, mentoring, therapy, accountability partnering and the like. Each health coach is designed for the wearer's specific motivational needs with personality options of cheer leader, drill sergeant, innovator, listener, challenger, or analyzer. This coach is available 24 hours a day, 365 days a year.[3] With similar innovative devices coming out on a regular basis, it is projected that the annual smart wearable healthcare market volume will increase from $2 billion in 2014 to $41 billion in 2020, reflecting a compound annual growth rate of 65% (Soreon Reseach, 2014).

Likewise in the medical science sector, discussion of health advancements continue with much of the development focused on health technology innovations. For instance, Cleveland Clinic's HealthHub reports on the top ten medical innovations of 2015 that are set to "reshape care." These include 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).

This list is by no means exhaustive as combined technology and medical science daily produce such remarkable advancements as 2015's first pill made by 3-D printing and approved by the FDA.[4] This technology serves as a prototype for future "custom-ordered" pills that no doubt will eventually address individual patient health concerns as the need arises (Preidt, 2015). On a regular basis such innovations combining technology and science bring change to the medical arena and in turn cause those who need medical intervention to be touched very personally by these remarkable discoveries. From the perspective of the general public and

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

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

medical professionals alike, these changes are generally welcomed. They are reacted to with curiosity and interest and responded to with a cautious willingness of adoption so long as they improve quality of life and overall health—the goal of research, development, and care within the healthcare profession.

1.2 CONVERGING INFLUENCES: MEDICAL COMMUNICATION, TECHNOLOGY, AND GOVERNMENT

The complementing roles of medical science and medical technology are certainly significant in the pursuit of health; however, these do not in any way diminish the equally important role of medical *communication* in the effective care of the patient (Polack & Avtgis, 2011).[5] Now more than ever communication has emerged as a key component in medical education (Livni, 2015; Association of American Medical Colleges, 2015),[6] government policy (United States House of Representatives, 2013), and practice application opportunities (Abdelhak & Hanken, 2016). Medical communication involves how patients are taught to participate in their own care; how decisions are made concerning best procedures and treatments for improving outcomes; how teams of health professionals interact to work together in making remarkable discoveries and maintaining basic patient care; and how the patients and professionals alike engage within the

[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 focus more on the medical relationship and the art of communication specific to that interaction. Health communication involves a much broader topic area including but not limited to promotion and public health education.

[6] Dr. Gregory Plotnikoff, Medical Director of the Center for Spirituality and Healing in Minneapolis, Minnesota states, "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" in his comments to ABC News on July 18, 2015 (Livni, 2015). This attention to communication is discussed throughout this dissertation but particularly in Chapter 6 with focus on the future directions of communication training from pre-medical degree programs, through medical school, residency, and post graduate training.

system to gain, apply, and share the knowledge and skills necessary to maintain health in an effective, satisfying manner.

The space within which this medical communication process flourishes is the "medicological environment,"[7] a term coined here 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 is a dismissive one, as when a health issue or breakthrough might not immediately concern an individual (e.g., the Dengue fever vaccine). At other times the change directly affects most peoples' lives as with 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 pre-existing condition.[8] The public, whether they are cognizant of it or not, are inherently affected by the changes that occur within the medicological environment since, theoretically, everyone in society must interact with the system at some point in his or her own lifetime. Health is 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 is the introduction of the Electronic Health Record

[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 is 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 particular act made the issue of healthcare most personal to the majority of the American public.

(EHR).[9] Unless patients notice the rows of physical charts missing in the physician's check-in area or react to the intrusive presence of a computer laptop during a physical examination, few appreciate the relevance of this particular innovation in healthcare. However, the more deeply this technology becomes integrated into the day-to-day practice of medicine by hospitals, physicians, healthcare workers, and patients alike, the more the EHRs' effect will be noticed.

To understand the context within which the 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 dollars 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.

In contrast, a portion of the American Recovery and Reinvestment Act 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 787 billion total available dollars to be used for health technology, namely for the implementation of EHRs. For the general public, few concerned themselves with

[9] EHRs are also known as Electronic Medical Records or EMRs. As discussed in Chapter 2, although some distinctions have been made between the two phrases, for simplicity sake, the term EHRs will be used throughout this dissertation. These simply are medical records that are recorded electronically into an electronic folder that holds all of the records of a given patient.

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 American Recovery and Reinvestment Act held the attention of the public. Meanwhile, quietly and systematically a new form of communication began to materialize within the boundaries of the 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]

1.3 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. This dissertation examines the initial reactions by the various users of this new health technology and the complex, interdisciplinary responses not only to the electronic recordkeeping but to the more transformative process of communicating electronically *within* the new technological medium of secured portals of the EHR systems.

[10] See Chapter 2 section 2.0.3 for a full discussion of the Meaningful Use Stages which needed to be met in order to acquire the incentive payments.
[11] The term, "medium" as used within this dissertation 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 healthcare professionals and the public, namely the physician and patient. Further discussion follows.

1.3.1 Chapter Two: Mediums and Policies

Chapter Two begins by looking at the various governmental policies that rather forcibly and abruptly thrust the healthcare system into the adoption of the 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 the 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 great 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, down-size, or leave their practices altogether.[12] Most importantly, however, this conversion process was a moral and ethical obligation as they were told 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, 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 government laws. That is, the physicians were "selling" the change so that they could show that patients were actually 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.

[12] This was the established scenario at the time. Some physicians have survived this retreat by down-sizing 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).

Eventually, patients started to look directly at the 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 the 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. This HIPAA (Health Insurance Portability Accountability Act) regulated communication within the 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

[13] Of course this did not happen at first. Even today there continue to be objections about whether or not patients have the right to see "all" of their medical chart. The Robert Wood Johnson Foundation has researched this with their "Open Notes" 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 worry some. 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 dissertation.

communication as well. This marked a significant change in how physicians and patients communicated about health.

Ultimately the stated goal of the 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 participatory, 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 45 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.

Today, only 48% of American physicians say they communicate with their patients online—evidence of the fact that the change has been slow in coming (QuantiaMD, 2011).[18] Patients and physicians alike have reacted to this process throughout recent years of adoption. Some have pushed to adopt this method readily and even before government mandates required this transition. Others have resisted adamantly, refusing to communicate online, and, in the case

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[15] Of course all transmission of information must uphold the Health Insurance Portability and Accountability Act (HIPAA) of 1996. See Chapter 2 for further explanation of this Act.

[15] 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 the EHR. Further discussion will be forthcoming. See Chapter 2 in particular.

[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 the EHR. Further discussion will be forthcoming. See Chapter 2 in particular.

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

[18] A wide variety of statistics are cited concerning physician/patient online interactions throughout this dissertation. This particular citation is the most recent one published by this source.

of physicians, even opting to retire rather than convert all office and hospital transactions into and EHR system. The key is, the change was introduced through the policies and government mandates outlined in this chapter. The path continues to be a challenge, but the process has definitely started. As more and more physicians and hospital systems convert, more patients realize the benefits to their own healthcare, and laws and regulations continue to push this conversion process ahead.

Finally, beyond the practical aspect of policy implementation and adoption, Chapter 2 examines the medium itself from a more McLuhanesque perspective. 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, layers of *mediums* exist. 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 medium of the electronic message itself which allows people to exchange information, and so on. Together these mediums take on a form of their own, a "sense ratio" as McLuhan would call it (McLuhan M., *Understanding Media: The Extensions of Man*, 1994). These mediums reorganize the information and the experience of communicating about that information in a manner that is unique to each user. Each user experiences the mediums differently depending upon how they perceive, engage with, organize, explain, and use 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.

1.3.2 Chapter Three: 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 sub-groups responding to changes introduced within the system, in this case, by EHRs and electronic medical messaging. Age, gender, socio-economic 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.

New guidelines within the healthcare industry have emerged to address the policy changes outlined in Chapter 2 and the response has been felt throughout the entire medical community—by physicians and patients alike. The old paternal system represented by the physician hierarchical structure has been challenged as the roles it relied upon become blurred. Patients come prepared to the medical interview with questions, articles, and pre-charted information while physicians 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 has now been replaced by a computer screen in the waiting area, the patient room, and the check-out counter. The physician even goes home with the patient; for, instead of making house calls, the Internet affords physicians constant contact, day and night, every day of the year. Patients learn quickly; and adapt readily. The medicological environment is characterized by a wealth of inter related influences including but not limited to the legal, governmental, political, environmental, technological, economic, and socio-cultural ones. This chapter examines the effects of all these influences in an effort to understand how the medium of electronic messaging within EHRs have systematically altered the way communication occurs across the healthcare profession. Change is studied as an expected function of an evolving new way of servicing the population by striving towards best health practices in a continuously changing space.

1.3.3 Chapter Four through Six: Applications and Future Research

Considering how many influences continue to affect the dynamic of the environment, a multi-methodological approach was chosen in an effort to demonstrate a wide variety of methods of observation from multiple perspectives, 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. Methods included both qualitative and quantitative approaches, namely oral histories, the critical incident technique, several surveys, and data mining through natural language programming content analysis.[19] The intent was 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. It was not even to say that the observational methods used herein are exhaustive or representative of all the ways this environment could be examined. The goal simply was to begin learning as much as possible about this medicological environment in order that the process of adoption of electronic messaging within EHRs might be observed and better understood. Future directions as discussed in Chapter Six might afford additional methods and subcategories for analysis. This project begins the analysis process in an effort to learn as much as possible about the particular point in time in which the transition towards EHRs began.

The choice to divide the analysis between rural and urban environments had both practical and theoretical motivations. Due to my graduate endeavors, I lived both in a rural and urban area with the rural area of Johnstown, Pennsylvania being my home and place of occupation and the urban area of Pittsburgh, Pennsylvania being my residence for graduate school. Therefore, I had lived experience through which I began to witness a number of specific similarities and differences, a number of relationships between key variables, and a number of questions that needed to be answered. In particular, 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

[19] Data mining is not the key focus of this study, but it is the direction that much of today's research is going due to the new availability of 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.

limitations, educational levels, media literacy, and location—to name a few. There were also a lot of forces newly at play at the time that I began my observations in 2008. President Barack Obama was being signed into office that coming January with the promise of a new healthcare law that would affect both the practice and reception of medicine. At the time I was not fully aware of the ramifications of this transition but the word “change” stood out not only from Barack Obama’s campaign motto but also from the mouths of the public whose cautious excitement was evident in their election of him into the office of president. 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 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, the beginnings of a content analysis of how these messages might be studied for future efficacy purposes, and an overall analytic perspective which all of these factors are drawn together for comparison and contrast.

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 who proudly claimed to be the “first fully electronic practice in the

Johnstown region." Next, interviews with four additional primary care physicians 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 in an effort to elicit the "voice" of primary care physicians 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 majority of the physicians in the region—not just primary care ones, but specialists as well. Finally, Chapter 4 also includes a Critical Incident survey on "patients" as represented by engineering and psychology students at the University of Pittsburgh at Johnstown. 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 messing 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 urban environments while reflecting upon the overall challenges and rewards that this conversion process has faced during this particular point in time.

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

1.4 THE FUTURE

Throughout this dissertation, many mediums are identified, examined, and analyzed in an attempt to understand this new method of communication applied within the field of healthcare. The "electric" nature of this organic medium seems "to have outered the central nervous system itself" (McLuhan M. , 1994, p. 247). Indeed electronic messages already exist in society in general but until now did not actively participate in the day-to-day interactions of physicians and patients. This may have largely been because of security issues, HIPAA regulations, EHR program development, interoperability between communication systems, and basic limitations of Internet and computer access. Despite such concerns, the electronic medical message now exists as an integral part of the physician/patient interaction. To study how this transition came about, to examine the reactions and responses of the participants, and to project what effect all of this might have on the physician/patient roles in particular and the face of medicine in general all make this medium compelling and worthy of study. Indeed many technologies and forms of communication exist in medicine, but this particular medium is new to the healthcare arena and promises to change the very face of medical communication for years to come in ways perhaps not yet unanticipated.

2.0 THE INTERLOCKING PERSPECTIVES

On February 17, 2009 President Barrack Obama signed into law the American Recovery and Reinvestment Act of 2009[20] and in so doing indirectly yet permanently transformed the future of communication between physicians and patients. To the general public, the Act represents an unprecedented effort to "jumpstart" the United States 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.[21] However, to the healthcare industry, this Act stands as the single most influential factor affecting how medical diagnoses, treatments, and services are funded; to physicians, it means 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 provides hope for more available and affordable care; to the technology specialist, it implies expanded broadband access for rural and underserved America; and for the medical communication scholar,[22] it opens the door for the active use of a new

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[20] Also known as the "Stimulus Package" and/or the "Recovery Act."
[21] 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)
[22] The term "medical communication" is used throughout this dissertation 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 often is used as a more general term including but not limited to the rhetoric of health campaigns and health-related research involving communication(s).

medium for physician/patient interaction, namely active electronic messaging about health between physicians and patients.[23]

Of the Recovery Act's 787 billion dollar stimulus allotment, 19.2 billon dollars funded the Health Information Technology for Economic and Clinical Health (HITECH) Act to revitalize the United States healthcare industry through the adoption, Meaningful Use, and secured transmission of health information technology.[24] This portion of the recovery opened the door to a transforming healthcare market destined to touch the lives of the entire United States population through dynamic policies, outcomes, and applications. Today, the ongoing distribution of a wide variety of health technology funds affects 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 face 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 today. Although many of these policies continue to be challenged by political, institutional, and private sector groups, the fact is that healthcare reform is here to stay, and it directly affects the way physicians and patients will continue to communicate throughout the near future through electronic messaging.

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[23] Certainly all healthcare providers including physicians, nurses, medical staff personnel, and a wide variety of ancillary professionals will also engage in patient online interaction. The main focus of this dissertation, however, is on physician/patient online interactions as evident in the research cited throughout this work.

[24] 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.

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

2.1 POLICY AND THE *PHYSICIAN* PERSPECTIVE

A number of regulations have directly affected the way in which physicians treat and manage their patients. These have evolved through changes in procedures, record storage, technology, and overall perception of patient/physician relationships. Indeed as Paul Starr (1982) notes 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 is a thing of the past. The transition into a world influenced by technology, government regulation, and corporate power makes Computer Mediated Communication (CMC), with electronic charts, visits, and messaging, a common practice in today's medical arena.

This portion of this chapter outlines the specific policy influences on the medical relationship from the professional, physician perspective.

2.1.1 The Hippocratic Oath

Prior to enactment of the HITECH Act of the Economic Stimulus Package in 2009, a number of previous policies and guidelines affected the general communication patterns that guided acceptable and safe physician/patient interaction. The earliest and most reputable of these is not a governmental policy but a significant one nonetheless: The Hippocratic Oath exists as "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). Fundamental to this document is the notion that a physician should respect the privacy of the patient and should work always to the best of his or her ability and judgment in an effort to "do no harm."[25] Still taken by medical students and physicians alike, this oath acts as a basic code of conduct for all physicians and remains strongly endorsed by the American Medical Association.

Its key focus on the essential privacy of all medical transactions (and actions) makes this timeless oath applicable across all mediums[26] of communication in that it includes the basic principal of respect for the health and well-being of the patient no matter what channel of communication occurs—written, oral, telephone, electronic, or video alike.[27] This concept acts

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[25] 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*, by Ludwig Edelstein. 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.

[26] 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 loud speaker 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) need to be distinguished.

[27] 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

as an umbrella of influence over all communication between physicians and patients and remains paramount in the social agreement between the two parties. To maintain patient's privacy is to honor the Hippocratic Oath. All subsequent policies must maintain this standard no matter the medium through which the communication occurs.

2.1.2 The Health Insurance Portability and Accountability Acts

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) stands 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.[28] This governmental policy originated from changes made to the Internal Revenue Code of 1986,[29] the Employee Retirement Income Security Act of 1974 (ERISA), and the Public Health Service Act (PHS Act), which dates all the way back to July 1, 1944.[30] Framed as a fundamental health security law, it emphasizes the enforcement of privacy rules (as outlined by the Office of Civil Rights); involves physicians, hospitals, and healthcare providers; ensures protection of all identifiable health information within medical records, billing, and patient accounts; and requires consistent standards of documentation, handling and privacy when dealing with records and communication with patients.

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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 indeed is particularly relevant to the online interactions and security issues of today and for this very reason, this discussion begins with this most fundamental "law" of medicine.

[28] 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

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

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

From the patient perspective HIPAA grants federal protection of personal health documents, which can only be shared with those who have direct health-related need for that information. This regulation on behalf of patients ensures that they are safeguarded from outside sources such as insurance companies, employers, and family members who do not have legal rights to this information. HIPAA provides the standards and rules that maintain 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 assures that information exchange mediums clearly maintain the standards set forth by the Hippocratic Oath; but now these standards are formulated into a law that must be upheld by all who practice medicine. In fact, 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.[31]

By 2008, as the Internet, emailing, and texting became more common place 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 electronic health records and electronic messaging through emails, the government appeared to view this transition as a potential impetus towards growth in a waning economy laden with rising healthcare costs, insurance restrictions on coverage, and massive

[31] 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 intension here of saying that the two are equal, only related in how they govern patient health standards.

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 lead to significant revisions in safety standards and security regulations that articulated online communication privacy issues, Electronic Health Record (EHR)[32] development, and general security issues for storing medical data involving Patient Health Information (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 of 2005 (PSQIA) 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.[33] 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 mediums, 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 states, "The proposed rule sought to implement the Patient Safety Act to create a voluntary system through which providers could share sensitive

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[32] The terms Electronic Medical Records (EMR) and Electronic Health Records (EHR) continue to be used interchangeably by many. EMRs typically refer to the individual records kept on each patient at physician offices and the 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 document will use EHR as the preferred term for simplicity sake.

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

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 continue as new advancements are made. Appearing in the *Federal Register: The Daily Journal of the United States Government* on January 25, 2013, the Health and Human Services Department (HHS) presented a document titled, "Modifications to the HIPAA Privacy, Security, Enforcement, and Breach Notification Rules Under the Health Information Technology for Economic and Clinical Health 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 states 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 require security compliance teams; (2) Physical Safeguards, which protect the electronic systems themselves from theft of equipment or data; and (3) Technical Safeguards, which authenticate and encrypt all accessible data. Hardware firewalls and encryption of electronic messages must be monitored for upholding these standards (HIPAA 101: Guide to Compliance Rules and Laws, 2013). This is to say that HIPAA revisions go 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 post graduate 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 post graduate education today. Within medical interviewing classes, in particular, students acknowledge the skill of communication in its effect on patient participation and health outcome. In residency programs across the country, communication has become a standard requirement as outlined by the national Accreditation Council for Graduate Medical Education (ACGME).[34] Many state boards of medicine including the American Board of Family Practice acknowledge the importance of communication through 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.[35] These continued changes in medical education increase the visibility of communication training and reinforce the relevance of such interdisciplinary research and ongoing study.

[34] For detailed accreditation requirements for individual medical programs, see http://www.acgme.org/acgmeweb/.
[35] To exemplify this process, it is to be noted that several presentations have been made by this author on multiple occasions on this topic for Continuing Medical Education (CME) for physicians and ancillary professionals. Recently, “Maintaining Patient Confidentiality and Security in an On-Line World” was presented on February 27, 2013 at the 33rd Annual Conference at the Slopes, Respiratory Care Conference at Seven Springs Mountain Resort, Champion, PA. 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 American Medical Association.

In short, although the newest HIPAA revision contains a plethora of details well beyond the scope of this document, the key point is that such ongoing regulations and revisions concerning security continue 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) continues, so do the laws regulating these changes.

2.1.3 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 1930's (Murray & Kane, 2009); [36] and, certainly, with the HITECH[37] portion of this law, it became the most significant influence to date on healthcare reform. From a medical communication perspective, the HITECH Act promises to change the very face of the entire physician/patient relationship as mandates assure that all patients can access care whenever they need it and in many forms, not just through face-to-face visits.

This right to patient care, as clearly articulated by the Institution 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), insures that healthcare providers are accessible at all times through the Internet, telephone, and any other technological means in addition to in-person

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[36] See http://www.washingtonpost.com/wp-dyn/content/story/2009/02/13/ST2009021302017.html in Washington Post (Murray & Kane, 2009).
[37] See http://www.hipaasurvivalguide.com/hitech-act-text.php for the Table of Contents and a direct link to the HITECH Act of 2009,

visits. This means that online communication between physicians and patients is not only welcomed but legitimately expected by consumers of healthcare. Although the IOM works outside of the government, acting as an unbiased and authoritative advisor to decision makers and the public, its advocacy ensures that most physicians are aware of the importance of electronic messaging—whether or not all physicians support their perspective.[38] The IOM argues that a trusting, effective medical relationship involves multiple communication channels including but not limited to electronic messages.[39] Although this endorsement preceded the HITECH Act by nearly eight years and is made by an outside, non-profit organization, it clearly indicates 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 is the Department of Health and Human Services (HHS),[40] whose mission is "to establish programs to improve health care quality, safety, and efficiency through the promotion of health IT, including electronic health records and private and secure electronic health information exchange" (HealthIT.gov, 2013). This department guides the implementation of the key eligibility standards physicians and hospitals must meet in order to transition into electronic health records (EHRs) in a manner that allows for "Meaningful Use" (a gauge for measuring how effectively health professionals implement the use of certified EHRs).

[38] 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 multi-mediated 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.

[39] For further discussion of the IOM, see their website at http://www.iom.edu/About-IOM.aspx.

[40] See www.hhs.gov for all references to health related documentation from the Health and Human Services website.

In an effort to explain why this Act is so important to the changing face of medical communication today, it is necessary to outline the process that physicians and hospitals alike must 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 have already begun the implementation of EHRs suggests that this transition will not and perhaps cannot be undone. In a sense, there is 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, insist that the traditional mode of physicians' visits is not lost; it merely is enhanced by options of communication that technology already introduced to the public. Now these new options cannot be "un-introduced." The face of medicine indeed spirals forward into a communication context filled with a technology that promises to alter the very nature of physician/patient interactions well into the future.

2.1.3.1 Meaningful Use *Defined*

According to HealthIT.Gov, (EHR Incentives and Certification, 2013), "Meaningful Use" is a measurement of how effectively and efficiently physicians and hospital organizations convert their paper medical charts into electronic form. Beyond the actual conversion process, Meaningful Use assesses 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 is for Meaningful Use 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, remains a goal for the efficient, effective, and secure EHR systems throughout the country.

In a sense, the entire system of physician/patient communication flows out of the EHR technology, making not only the recording of information important but the way in which the information is gathered, transmitted, and discussed important as well. To "meaningfully use" this technology from a government standard is clearly outlined through a set of criteria which are necessary for effective implementation of this vastly influential change. To meaningfully use this technology from a patient perspective perhaps means to succeed in helping *patients* participate in the medical communication process in an effort 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 is yet another aspect of the Meaningful Use agenda—and problem. Systems do not "speak" to each other (1) because most are being independently created by over 600 individual vendors (Lynn, 2012) and (2) because the coordination and sophistication of technology has not yet reached this point.

An example may serve to clarify the state of affairs: Even the Veterans Affairs (VA), government-run hospital system has not yet managed this feat of interoperability. In fact, a bill introduced into Congress on June 28, 2013 (113th Congress, 1st Session, 2013)[41] 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

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

service men and women to have a single EHR throughout their entire military career; however, this did not happen. Although efforts continue through Congress to force such interoperability standards to be imposed in the government VA hospital system, the goal has not been met. Certainly, if such an effort has not been reached through a single agency (vast though it is), the thought of imposing a nationally or one day globally interoperable system seems almost impossible, at least at this point in time of technological change.

Interoperability between systems exists as a major stumbling block for true collaborative care. The Office of Standards & Interoperability (OSI) at the U.S. Department of Health and Human Services (HHS) strive towards 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 are four areas of EHR technology that are particularly critical:

- How applications interact with users (such as e-prescribing)
- How systems communicate with each other (such as messaging standards)
- How information is processed and managed (such as health information exchange)
- How consumer devices integrate with other systems and applications (such as tablet PCs) (HealthIT.gov, 2013)[42]

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

Privacy and security standards cannot be compromised throughout the conversion process. Secured messaging and not open-source messaging is vital to the integrity of this transition. Communication through secured channels must be assured by both the physician and

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

patient in order that a trusting, safe, confidential environment may encourage open lines of communication within the medical relationship.

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

2.1.3.2 Meaningful Use from an *Economic* Perspective

To assist and motivate physicians and hospitals to work towards Meaningful Use, the government has implemented a qualification program of incentive payments for Medicare and Medicaid participating providers through the Center for Medicare & Medicaid Services (CMS.gov, 2013).[43] As part of the 19.2 billion dollar HITECH Act stimulus package, eligible participants who show Meaningful Use in converting their records to EHRs, may 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 must treat Medicare and Medicaid patients and must demonstrate prescribed standards of usage (Centers for Medicare and Medicaid Services, 2013). All eligible participants must therefore register for each of the EHR incentive

[43] 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/.

programs and then "attest" to meeting the requirements.[44] This incentive system is designed in stages for adoption and appropriately called "The Stages of Meaningful Use."[45]

In brief, the stages, projected implementation deadlines, and general purposes are 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. [46, 47] Final criteria for all three stages remains pending, with Stage One only finalizing specific criteria and beginning to accept proof of Meaningful Use as of July of 2010.

For Stage One, all eligible parties must be examined on 25 total criteria with 15 required core competencies and 5 out of 10 menu requirements. Although reaching Stage One Meaningful Use is currently voluntary and rewarded with maximum incentive payments, federal laws require that Medicare reimbursement rates for non-participating physicians will decrease for all eligible professionals who do not meet Stage One requirements by 2013 (technically within 90 days of the end of the fiscal year which is September 30, 2012) and will likely see at least a 1.5% Medicare pay reduction by 2015 or sooner (American Medical News, 2012). Some project 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 is no way of predicting for certain the extent of these penalties, but they will happen. Incentive

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

[45] 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/.

[46] See http://www.healthit.gov/policy-researchers-implementers/meaningful-use.

[47] Discussion of the communication ramifications of these stages is in Section 1.1.3.3. For now this summary is intended to reflect the huge impact of these Stages on provider navigation of the healthcare system. Certainly the complexity alone of this system has forced many to spend significant funds not only on new EHR systems but on staff and advisors who can assure that the requirements are met to avoid penalties.

payments have motivated some, but penalties will likely motivate others either to begin EHRs or at worst drop out of the medical profession altogether (Pittman, 2013).[48]

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 have questioned the aggressive push forward when not all eligible parties have even completed Stage One. In fact, the American Medical Association (AMA) and the American Hospital Association (AHA) currently challenge these dates, arguing that requirements are too stringent and too soon for adequate conversion for the vast majority of the users. Although the AMA and AHA support widespread adoption of EHR systems, they feel flexibility in the programs must be achieved in this already "over burdensome" set of laws (Commins, 2013).

A specific example of this resistance is 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" (American Medical Association, 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 may impede the provision of quality patient care and impact patient safety" as the lack of a standardized report format [through EHR record-

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[48] According 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.deloitte.com/view/en_US/us/Insights/centers/center-for-health-solutions/a5ee019120e6d310VgnVCM1000003256f70aRCRD.htm#

keeping and transfer of data] “has the potential to increase interpretation errors and decrease efficiency as physicians review unfamiliar reports with varying layouts” (p. 91). In addition, it states, “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 is arguing that standardization on one hand might increase interpretation errors with variable report formats while at the same time realizing this might increase errors because of the oversimplification of the formatting. That is to say both the lack of standardization and the abundance of it may lead to serious error. The system as it stands does not appear to be “fool proof” by any means. The AMA argues that further assessment of these stages is needed before rushing forward to subsequent stage requirements. In addition to these reservations concerning Stage One, the AMA argues that “Stage Two standards are too aggressive and burdensome for physicians” and that “the Meaningful Use EHR program will remain low unless the Stage Two requirements are made more flexible” (American Medical Association, 2012, p. 91). Certainly a “red flag” is being 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 12 months for fear that the program will “outstrip the capacity of many certified electronic health record technology vendors and ambulatory family medicine practices” (Leawood, 2013). Stream further argues 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 who do voice their opinion on delaying this move forward.

Despite these warnings, governmental agencies proceed 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 18 month period (through April 2015 for eligible hospitals and June of 2015 for eligible physicians) to allow time for those who have purchased EHR systems to upgrade their technology versions of electronic records in time for the Stage Two deadlines. The AHA supports this as being the most realistic extension for attestation while allowing those ready to proceed forward to do so (Murphy, 2013).

With such concerns over the progress of Stages One and Two, plans for Stage Three remain on target but certainly far from finalized. At best the U.S. Department of Health and Human Services suggest 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 of 2012 called the "Meaningful Use Workgroup Stage Three Recommendations" (Tang & Hripcsak, 2012). The timeline outline is quite specific as well with a proposed approval of final Stage Three recommendations by April of 2013. This deadline was obviously not met. Further discussion and analysis of the entire Meaningful Use process remains open for continued review and revision. At the same time, it must be restated that a very strong impetus for change and immediate change continues to exist throughout governmental offices with little sign of letting up.

2.1.3.3 Meaningful Use from the *Physician* Perspective

The real question is, how does all this translate into the day-to-day practice of medicine with real patients who need medical treatment and real physicians who need to run a business in order to help their patients? What does this mean to the average physician who wishes to convert to electronic charts because he or she believes they make sense in a changing technological world yet knows that expenses may be insurmountable for most practices, especially smaller solo ones not supported by larger hospital assistance? Can all this really help the physician/patient relationship or is it destined to dismantle the very essence of the "trusted relationship" so integral to the safe environment of the private office visit? These questions are not easily answered. Perhaps they cannot even be answered until this chapter of the changing face of medicine unfolds in years to come. However, what can be answered is where physicians are right now in the area of EHR adoption and online communication with their patients.

A look at the current state of affairs in physician implementation serves to shed some light on just how well this mandate is actually working so far as motivating physicians (and hospitals) to move forward with this massive undertaking. The United States healthcare system is being hurled towards an ideal of online communication, interoperability, and technological transformations without realizing the unforeseeable extent to which this technology will actually affect the very core of what it means to communicate with and treat patients. This is not to say that such ideals are not possible or even probable. It is to say, however, that the conversion to online medical communication through the first step of EHR implementation is as yet 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 indicate 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.[49]

Although the incentives from Medicare and Medicaid alone may address some of the upfront expenses, this does not include the ongoing software upgrades that parallel the ever-changing regulations mandated as the stages are updated, the training of employees, the cost of maintenance fees, and the like. In fact, despite such projections, there was (and is) no way of knowing (1) how much the actual transition into electronic medical records will cost per practicing physician considering all factors not just including actual EHR equipment itself, (2) what direction the software and supply companies will need to go as changing goals and expectations surface, (3) how high costs may rise as organizations and individual physicians change EHR systems due to unsatisfactory or inadequate performance (Dolan, 2013; Denton,

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

2013; iHealthBeat, 2013),[50] and even (4) what legal costs may emerge as a result of physicians and hospitals suing EHR vendors for inadequate products (Gallegos, 2013).

Despite this seemingly bleak picture, physicians and hospitals continue purchasing and implementing EHR systems, meeting Stage One requirements, and working towards satisfying Stage Two criteria. According to a review in *Healthcare IT News* (Miliard, 2013), 15 billion dollars in Meaningful Use incentive payments have already been distributed by the Centers for Medicare & Medicaid Services to eligible participants. According to a Robert Wood Johnson Foundation special report, not even half of the eligible hospitals and physician practices have met Meaningful Use (Robert Wood Johnson Foundation, 2013). Specifically, 42% of hospitals have met functionalities meeting Stage One and more than 38% of physicians have reported adoption of EHRs in 2012.[51] 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 seem rather alarming considering that over 78% of the total money reserved from the 19.2 billion dollar budget for the HITECH Act has already been distributed (even without Stage Two and Three formally initiated).[52]

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[50] 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).

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

[52] Oddly, to the best of this my knowledge, no one seems to be articulating (at least not in writing) the fact that the entire amount of money set aside to implement the HITECH Act (19.2 billion) is nearly spent. If the allotment no longer exists, how will the government distribute these incentives? Perhaps some feel that this funding will not matter since fewer and fewer will meet the requirements necessary for the next stage. Then, once the incentive period is passed, the government will be charging penalties, which possibly will afford some reimbursement of the already paid out funds for Meaningful Use. The answer yet again is not evident. One can only surmise the impact of this entire incentive program on the national healthcare economy.

Reports on specific usage patterns of those who have implemented EHRs seem to reveal a relatively favorable pattern, at least for those who already have reached Meaningful Use. For instance, in a 2013 survey of 1,820 primary care physicians and specialists in office-based practices using EHRs, 80% are viewing laboratory results of drugs, 74% are 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).[53] 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,[54] 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 represents nearly 80 percent 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 have 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 indicate a much higher adoption level than those reported in the

[53]Note that many of these usage patterns are part of the Stage Two Meaningful Use requirements, indicating that these physician practices are 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.

[54] In October of 2013, Mostashari stepped down from his position followed by Lisa Lewis who was acting Coordinator in 2014 for a five month period. At the time of this dissertation, Robert M. Koloder, MD is the 2015 National Coordinator.

studies noted above and suggest that the data from this more recent study might represent different population samples over a much later period of time. No citation is given for these numbers, forcing their credibility to rest on the reputability of the National Coordinator. [55]

Mostashari goes 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 adds, "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."[56] Throughout his entire talk he reinforces the notion of patient-centeredness and engagement as the goal of new technology and insists that physician and hospital participation really embraces the trend of active participation with patients in achieving improved health.

2.1.3.4 Meaningful Use from the *Patient* Perspective

As demonstrated throughout the preceding references, much of the rhetoric surrounding news reports, public statements, and government websites suggests that the entire purpose of this change is for the good of the patients in order that their shared participation might lead to better care, more care, and even less expensive care.[57] Words and phrases include "instruments in their

[55] 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 percent 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.ihealthbeat.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, this questions the credibility of the source.

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

[57] It is to be noted that "affordable care" will not be discussed until part 1.2, although reference to money has been made in light of the overall costs of implementation and government incentives.

own care," "engaging the patient," "patient-centeredness," "cooperation," "collaboration," "shared decision making," and "participatory care." As these filter onto the pages of government documents, health literature, and educational policy for healthcare professionals, the image forms of physicians, hospitals, and even government services all working together to place patients at the center of concern. The ideal goal is to help patients help the providers improve care for all. Healthcare providers not only create benefits for patients themselves but they can also help insure that effective, patient-centered change actually occurs. As active participants, patients will have invested time, energy, and commitment to the process and therefore will hopefully be more likely to accept the transition into this new medium of communication when it comes into final force (Stage Three Meaningful Use or beyond). Implementation of technology, cost efficiency, reimbursements, time management, and the like are viewed as the necessary means to the end product of improved health for patients. Patients are as much a part of this transition as are physicians, hospitals, and government officials. In fact they are the most important part and the reason for this change in the first place. This is the ideal that seems 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 can afford to keep their doors open. The problem is 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 means to the *patient* who perhaps cares 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 meets.

The whole medical situation today is 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 are influenced by these standards, many are players in this complicated drama, and many simply react to the services they can or can't acquire when they most need them in the midst of an illness, emergency, or tragedy.

The purpose of this segment *is* to explain in simple terms what Meaningful Use can, will, and should mean to the patient from a receivers perspective. What effect does this have on the lives of those who unknowingly enter a system that is not what it used to be? When an elderly patient walks into her physician's office hoping to chat about her husband's forgetfulness and her own debilitating arthritis, she may not anticipate a kiosk computer for "signing in" and a physician whose face hides behind a laptop screen. These technological mediums affect the fundamental process of communicating with one's physician, and to some that process is all but "meaningful" when technology takes away the familiar environment of the traditional examination room and replaces it with (the backs of) computer screens.

Meaningful could be viewed as the desired transition into this new medium in a manner that is efficacious, a manner that is perceived to be working from the perspective of the patients, not only the providers. This perhaps is the real test of Meaningful Use, a test that is not so easily measured in numbers or dollars. Rushing to meet Stage One, Two, and Three deadlines in 2014, 2015, 2016, or 2020 for that matter means very little to patients. Their only concern will be when and if the familiar face-to-face office visit is 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 will not be realized, especially if patients see themselves as part of the necessary process to achieve a better healthcare world that uses technology as a means for reshaping the focus back to the patient, the real center of concern. Until the patient navigates through the new and adjusts to the different, it may, however, be quite a foreign process. Fundamental for making this transition meaningful, is to explain to the patients how these stages affect their own communication within this dynamic system. With the exception, perhaps, of indirect references to technological problems within physicians' offices, however, this explanation is not being made.[58]

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

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

To make matters even worse, not only are some *patients* media illiterate or media challenged so too are many *physicians*. That means that as some physicians attempt to meet the technological demands of their new EHR system, they may spend more time trying to navigate the computer screen than paying attention to the worried looks on their patients' faces.[59] That is to say, if the medical communication is to be effective within the physician/patient dyad both parties must understand the challenges and shortcomings as well as the benefits and advancements of this new medium of communication. If patients are truly to "share" in the medical encounter, then they together with the physician must learn to navigate through the transition into electronic medical records. Sadly, much too much time has been spent in transitioning into the *mechanics* of the process than in the *relationships* that must survive and benefit from these so called advancements.

In an effort to begin this process of understanding, it is important to explain the key elements of the Stages of Meaningful Use from the perspective of the consumers, the *receivers* of and participants in their own medical care. Then and only then can this process be truly a joint endeavor towards physician/patient communication.

Just as the stages reflect a wealth of intricate changes and implications to physician and hospital practices, the stages in principal could be explained with the same level of complexity to

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[59] A personal experience may clarify: As Office Manager of my husband's family practice and geriatrics office, I have witnessed firsthand the transition into EHRs. At age 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 which he did not necessary agree with. 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 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 for helping not only 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.

patients. More practically, however, only the most basic implications of each stage are necessary for the vast majority of the patients to understand why change is being made, how this might affect their communication with their hospital or physician's office, and what to expect throughout this transition period. Obviously, some physician offices may have introduced forms of technology at various times even prior to the HITECH Act. These may include emailing patients, referencing the Internet on smart phones, or using a computer to record information. This suggestion looks only at physician practices and assumes that the office made a cold transition from the physicians using no electronic technology with patients (other than perhaps secretary billing which has been around for the twenty or more years for most practices) to the minimum technology required for each stage.[60]

Quite simply, Stage One introduces computer technology to the physicians' office through the active use of recording electronic health records (EHRs). Four key items affect patients: (1) electronic prescribing, (2) electronic recording of patient records, (3) some patient electronic access to medical records, and (4) likely introduction of computers into the examination room. First, prescriptions are sent to pharmacies electronically in an effort to reduce legibility errors, speed the process for patients, and maintain an accurate, updated record in the patient chart. Second, records are 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 document subsequent appointments and interactions, the data is then recorded manually directly into the electronic

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[60] It is particularly important to stress that throughout this discussion of the stages' effect on patient communication, this is by no means reflective of all the implications, nuances, or even influences on patients at every phase. These are only the items that this author believes are most important in light of the basic information patients should have on the stages in order to appreciate and become more involved in the process. This focus also presupposes subsequent chapter research discussed in this dissertation. This is not intended to be all inclusive.

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 is 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). Fourth, the computer, laptop, tablet, or iPad is brought into the room by the physicians and nurses. As discussed in subsequent chapters, this aspect for the most part is the most noticeable of all the changes since in fact the patients physically see the computer, watch the physicians put in data, and contend with the presence of this new instrument often physically standing between the physician and patient throughout the office visit.

Stage Two presupposes 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. The first item simply means that each phase of Stage One will be continued but will be more actively and proficiently used within the practice (based upon the increased requirements that physicians need to verify through their Meaningful Use attestation). Patient involvement will likely improve as well as a result of the implementation of the second item: the secured patient portal. This means that patients can enter the EHRs through a private environment with a user name and password. This environment allows 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 transforms the availability of the office from regularly scheduled hours and answering machines to 24-hours-per day, 7-days-a-week access to patient information and (for the most part) communication with the staff. This window provides—for the first time—online communication directly with members of the staff and physicians, opening the door for a totally new mode of medical communication.[61] More specifically it also allows 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 may be entered even prior to seeing the physician for the first time. Records from other physicians can be uploaded and scanned immediately into the chart. The records are now accessible directly instead of only through an electronic copy (as in the CD) and the means for communication is potentially continuous.

Finally, Stage Three most likely will mean continued improvements in communication, accessibility, and document access. However, the change likely will be that now patient data will be entered into larger record-keeping data banks allowing 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 allows for interoperable transference of health records and immediate access from one institution to the next (HealthIT.gov, 2013).[62] The latter is particularly helpful to patients who travel, utilize a wide variety of specialists, or have testing done in more than one place for the same thing (such as when urban hospitals request repeat testing due to lack of access to rural hospital results or testing standards). This also means that data from patients may be entered into a national data bank which is

[61] Note this is merely being mentioned herein, but the significance of this one factor is in this author's opinion, the single most important communication change in the face of medicine since the telephone. For further discussion, see Chapter 2.

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

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 is likely that the most important change to them will 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 is to prepare them for how computer technology will alter their ability to communicate with and between their providers. That is, (1) the computer will likely be in the room with the patient as part of the exam process and (2) the computer will allow for continuous access to the physician office and medical information through the use of the online secured portal. The latter of these two is of course the most significant to the purposes of this dissertation in exploring how physician/patient electronic messaging within secured portals affect the dynamic, participatory relationship of this dyad and in turn help maintain the patients' overall health.

2.2 POLICY AND THE *PATIENT* PERSPECTIVE

Unlike recent policies developed for the physician and health organizations, patient policies for the most part remain relatively visible to the public and notably few. Actually, a single act associated with the HITECH Act of 2009 exists as the most important one directed towards healthcare reform in recent years. This act, often referred to as "Obamacare" or "The Affordable Care Act" (ACA) is fully named the Patient Protection and Affordable Care Act (111th Congress, 2010)[63] and was signed into the Patient Bill of Rights on March 23, 2010 and later

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[63] 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).

revised as the Health Care and Education Reconciliation Act of 2010 (111th Congress, 2010)[64] on March 30, 2010. Many features of this act affect 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.

2.2.1 The Affordable Care Act

More specifically, this law acts as a series of insurance reforms that follow 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 include coverage for children with pre-existing conditions, coverage for young adults under 26, no more lifetime limits on coverage, no more arbitrary cancellations or rescissions, right to appeal health plan decisions, consumer Assistance Program, small business tax credit, temporary coverage for people with pre-existing conditions, and new community Health Centers. The 2011 programs involve prescription drug discounts for seniors, free Medicare preventive services for seniors, the 80/20 Rule (Medical Loss Ratio), and a total rate review.[65] The 2012 projections add preventive 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 pre-existing conditions, savings on monthly premiums and out-of-pocket costs, Medicaid expansion, no more yearly limits on coverage, and

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[64] 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).

[65] Each of these sections may be 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 law.

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.

2.2.2 Patients Place "In Charge"

According to the Department of Health and Human Services website, (U.S. Department of Health and Human Services, 2013) the Affordable Care Act "puts consumers back in charge of their health care." This website goes into more specific detail concerning coverage and care;[66] but, more significant to the purposes of this discussion, it further reinforces the perspective of patients having the freedom to choose how, when, where, and by whom they acquire their medical health. This "choice" aspect likewise strengthens the argument that not only should healthcare be "affordable" by all, but that it is designed for the central benefit of the patients who now are viewed as "back in charge" in managing their own personal health goals.

For the first time, patients are openly discussed as having a level of control over their own care. They can 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 is considered the focus of concern, the focus of change, and the focus of engagement.

From a patient perspective, the Affordable Care Act is designed to help patients improve health access while the Stages of Meaningful Use are designed to increase patient participation

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

through secured health portals and electronic medical records. Granted, the government objective is to decrease costs in multiple ways such as having interoperable systems and decreasing unnecessary, expensive repeat testing. The framing of how these policies are portrayed to the public, however, focuses 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 reduce costs, improve efficiency, and ultimately make the healthcare system more effective. The framing of all this is around patient care. As shown, the policies involved certainly go well beyond this single focus.

2.3 POLICY AND THE *MEDIA* PERSPECTIVE

Two interlocking issues exist from the perspective of the media itself: universal access to online communication and increased mobile communication. Simply put, the ideal goal is 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/or computer means as possible. Most importantly, unless broadband capabilities and high-speed Internet functionality reach urban and rural areas alike, not all U.S. physicians can participate in the goals of Meaningful Use and not all members of the general public can meet the 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 moves forward, so do the demands on the monitoring of the media itself. That is, as technology develops, appropriately managing the pace and direction in which the technology develops is critical. Finally, even though the focus in this segment is on expansion, development, and access, it must always be kept in mind that security and privacy are still factors that work hand in hand with the speed and manner in which this technology advances.

Again in an effort 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 exist than are discussed herein. This segment is intended to give a flavor of how media itself is related to the overall concerns for communication online in an equitable and safe online world.

2.3.1 The Telecommunications Act of 1996

In the same year that the Health Insurance Portability and Accountability Act (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).[67] 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 healthcare providers (HCP) 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

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

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 reasonable to afford service 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 makes these initial programs so important to healthcare is that now for the first time access to Internet and related programs become 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.

2.3.2 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 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, public and private non-profit healthcare providers. Although some questioned the effectiveness of this developing program (Whitten, Holtz, Krupinski, & Alverson, 2010), [68] 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) continues to expand the availability of robust broadband networks and (2) allows 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 helps healthcare providers to organize consortia to enable networking that allows access to greater bandwidth, higher quality of connectivity, and lower rates than available to individuals (Federal Communication Commission, 2013). In effect, the HCCF allows 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. [69] Thanks to these programs, medical specialists throughout the system now have increased government support through the various FCC programs to continue towards Meaningful Use.

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[68] In 2010 an analysis of the related 2007 Rural Health Broadband Imitative 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).

[69] 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.

2.3.3 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 lead 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).[70] 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 goes beyond the focus of online email communication through secured portals, but it opens 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 is electronic messaging; and, if this information is going to be transmitted into patient health records, it must be done in a secure, private manner that follows all HIPAA regulations.

[70] 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.

The activity of the mHealth Task Force continues and in fact has become more visible to those who depend upon its endorsements for continued advancements in eHealth communication. It is evident that multiple groups have complimented each other in capturing the complex needs for reaching a full overhaul of the telecommunication regulations and capabilities in healthcare today. Indeed the answers are not all available. New policies emerge as new standards are desired and new technologies are introduced. The world of mHealth, eHealth, or just plain, electronic health communication, is indeed here to stay.

2.3.4 The National Telecommunications and Information Administration

Sometimes confused with the FCC, the National Telecommunications and Information Administration (NTIA) is actually the main federal office involving influential regulations for electronic health. It works out of the United States Department of Commerce. Together, the FCC and NTIA monitor the limited resource of the available federal and non-federal spectrum for mobile and fixed wireless broadband use. The federal government pays particular attention to how this limited resource is made available for the benefit of advancing technologies throughout the country (in this case, particularly, eHealth technology). The specific purpose of the NTIA is to assure that "America's domestic and international spectrum needs are met while making efficient use of this limited resource" (National Telecommunications and Information Administration, 2013)[71].

[71] 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.

Very basically speaking, there is a limited resource of “space” for wireless networks to send signals. Due to the digitization of many radio and television networks, some “whitespace,” or unused bands of spectrum remains available. The careful monitoring of this space has been 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 towards digital health and its growing influence on the national healthcare system through the HITECH Act indeed empowers the NTIA as well as the FCC with a job that truly controls 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 is the 4.7 billion dollar Broadband Technology Opportunities Program which allows 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 is a 650 million dollar 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 serves to reemphasize the wide-spread scope of the technological transition from analog to digital systems that will inevitably advance the overall technology of the American household. The former program, of course, is where much of the money is coming from for the HITECH Act’s expansion of eHealth technology.

2.3.5 The Inter-Relational Factor

What becomes obvious as one steps back from these many policies and social programs that have intertwined and complemented each other over the recent past is 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 particular programs. However, in the end, technology speeded 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 smart phones and instantaneous forms of messaging; a seriously inefficient, overtaxed healthcare system suffered from vast over spending, unnecessary repetitive testing and screenings, and insurance reimbursement issues; and the general public demanded to be at the center of their 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 United States healthcare system at large.

2.4 MEDIA AND THE *MEDIUM* PERSPECTIVE

The notion that technology exists 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 electronic health records all culminated with the HITECH Act of 2009, technology seems to both cause and react to the unsettling environment of healthcare reform. As electronic messaging becomes introduced as an acceptable, common means for communicating with physicians, the need for mandated secured portals exists not only for privacy reasons but for the new-found opportunity to “speak” to a physician on demand, at any time of the day or night. Instant recordkeeping of these messages in electronic charts can be accessed by physicians and patients alike through shared electronic portals that at any given moment can 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 are accessible by each party, they also can be communicated *about* through the process of electronic messaging within the very portal of the EHR. Indeed the technology emerges as the medium through which the public views “Obamacare,” not so much because of insurance reforms and affordable care but because the medium through which their communication is transmitted somehow causes the entire nature of the physician/patient relationships to be different from ever before.

2.4.1 The Medium as a System

In *Understanding Media: The Extensions of Man*, Marshal 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)

Indeed the HITECH Act with its requirement of the secured portals through which the EHR is accessed and electronic messaging takes place, has become a significant systemic change for medicine affecting all related systems throughout the United States. In fact, once the Stages of Meaningful Use are fully implemented, potentially everyone who engages in the healthcare system (which is basically every U.S. citizen), will have been affected by the use of this system in one way or another.

McLuhan further argues 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.[72] The message could be read

[72] Joshua Meyrowitz refers to this notion as "medium theory" which he says 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).

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 the context in which it is said, past history, the 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 hand writing 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 48 hours, it might be interpreted based upon the exact time of day the message was written, the surrounding information given, 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 affects 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 would argue. That is, when physicians or patients choose to use the electronic service, it says something about themselves as users: their attitude towards the medium, their overall disposition towards patients, 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. If older physicians, for instance, implement a new EHR system and actively use electronic messages with their patients, this action itself conveys something about them as users. Perhaps younger patients might perceive these physicians as being up-to-date, open minded, or willing to meet them at their level. If physicians complain about the use of the medium to their patients and say they are only using it because they "have 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 patient point of view. How physicians perceive their patients has an effect on whether or not they feel the patients will want to use the online portal. If the physicians feel their patients are too old, technologically challenged, not interested, or too poor to afford the Internet, the physicians may not feel the effort in transitioning into the secured portal system is even worth it. Or, they may decline to offer the service to patients based upon their perceived assumptions about their patients' overall desire and willingness to use online messaging. Perceptions, therefore, affect how successfully the implementation of the secured portals will be and how much the form of interaction will be a part of the evolving relationship between the physician and patient. The medium transmits the messages between users, affects how those messages are interpreted, says something about the users' attitude towards 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 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 has become a "new" medium through which physician/patient interactions can share in the process of improved health through online dialogue that now not only is available to and expected by patients but is mandated for physicians to use as part of the requirements of Stage Two Meaningful Use.

McLuhan's notion of a systemic change seems particularly apropos as indeed the entire system of how physicians now are and will be communicating affects the laws, the economy, the healthcare industry, the technological transmission systems, and the relationship between the physicians and patients. Indeed this transformation marks a period in which the face-to-face, in-office visit becomes not replaced but *re-envisioned* as a field of options for how patients engage in their own health through a multitude of communication mechanisms. The medium of electronic messaging forever alters the potential patterns of communication within the evolving physician/patient relationship.

2.4.2 The Medium as a Mechanism of Change

This dissertation acknowledges the complex climate divergently influenced by government lawmakers, healthcare providers, consumers, and technological advancements. Certainly the formation, approval, and implementation of the HITECH Act of 2009 created a social "tipping point"[73] for reform. As earlier discussed, from a technological perspective the single most influential and transformative change came about with the mandated EHRs which require 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 are transmitted through the EHR portal affect the overall relationship of the physician/patient dyad in an effort to determine whether or not this medium works (or at best is perceived to work) in helping to improve health. This exploration of electronic messaging between physicians and patients reflects the perspective that the EHR has provided a secured environment within which the *possibility* of safe online communication exists. Indeed issues of online security will continue to challenge this medium; but the effort to create a safe environment for the shared decision making unit of the physician/patient dyad is critical to the efficacy of this medium as a fundamental mechanism of change.

A number of 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 methods approaches in examining the use of electronic

[73] The concept of "The Tipping Point" surged into popular use with Malcom Gladwell's book by the same name (2002). Gladwell states 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).

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 this wide range of methodologies and perspectives used in exploring how people view and involve this medium of communication within the healthcare context. This dissertation likewise applies a mixed methods approach by including both quantitative and qualitative research in exploring how physicians and patients perceive and use electronic health messages. In particular, the next chapters use surveys and interviews to explore how perceptions affect 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 series of discussions is to explore how the medium of electronic messages is perceived by physician/patient users and how these messages function in influencing the dynamic evolution of the physician/patient relationship in its quest to achieve effective, satisfying health outcomes.

3.0 THE MEDICOLOGICAL ENVIRONMENT

Multiple converging perspectives create and influence the complex, conceptual environment surrounding electronic health communication today. Patterns of adaptive change surface and resurface as electronic messages shared between and among medical professionals and patients influence an interlocking public response from these participants. The government mandates for meeting Stages of Meaningful Use[74] have thrust users forward into the unchartered space of electronic communication while more and more responses emerge from the public, the professionals, and a wide variety of related disciplines who also find themselves engaged—willingly or not—within this space. Contributions from the fields of technology, medicine, psychology, law, sociology, media, and communication alike create a composite resultant reality much more complex and far-reaching than what is 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."[75] 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

[74] See section 2.1.3 in Chapter Two on Meaningful Use.

[75] 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, is not typically used at present and does not encompass the wide variety of disciplines and influences as the "medicological environment" is intended to include in this document.

exist within society.[76] 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 interact within and perceive this environment. Both are active participants that 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.[77] Driven by medicine yet affecting and being affected by the public socio-economic 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 should emerge 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

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[76] 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.

[77] 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 (the emotional self) 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).

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 towards 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 itself. 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 government mandates or technological advancements) because it is in fact an open system. However, this dynamic environment continuously works towards 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 stands as the visible impetus of a transition that filtered throughout society slowly yet purposefully towards reform. The political laws for the Stages of Meaningful Use now require 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. This transition as yet remains in process. Many physicians have resisted the change, many have asked for extensions in or have stated such a transition would be a “hardship,”[78] and many have argued that the laws are 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 have complained too that the limited commodity of time is 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, have weighed in on the realization that this has all somehow altered their own perceptions, expectations, and new-found needs when navigating the evolving healthcare system as it exists today.

Indeed many have resisted the change; yet many have 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 have responded in an effort, perhaps, to adapt to and learn from this new medium for communicating about health: (1) The Socio-Technological 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 play a part, helps define this system of change. Here multiple interlocking perspectives affect the discourse and action of the participants within this evolving medicological environment.

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[78] The www.cms.gov website may be helpful as well as the following link: http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/PaymentAdj_HardshipExcepTipSheetforEP.pdf pages 3-4. This government document shows how “hardships” are recognized by the government and help alleviate some of the implementation woes of underserved areas who have little Internet access or eligibility for EHR contracts.

3.1 THE EVOLVING SOCIO-TECHNOLOGICAL RESPONSE[79]

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 United States 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 has significantly altered the face of communication within and between information systems and organizations today. It started as an intriguing phenomenon, a novelty for high-tech users and ended up a central part of society's day-to-day environment.

Now everything from emailing, to texting, to Facebook, to Twitter involve socially networked exchanges of messages that can all be transmitted through the same mechanism: the computer. Except now the smart phone is a computer and the computer is a phone;[80] and through all these media exchanges, society transmits messages from person to person through these computer screens of various sorts with the very basic desire to exchange information. This indeed is a far cry from Ray Tomlinson's first email, but it shows how explosively the advancement of technology can 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), suggests that multi-purpose, overlapping media formats exist with fewer and

[79] 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).

[80] The fact is that all forms of media are starting to merge in that they begin to share functionality. In this case, the smart phone 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 McLuhanesque sort of concept, the meshing of multiple technologies into a network of interlocking parts.

fewer unique characteristics, limitations, and technologies. Converging mediums afford communication diversity almost unimaginable in the day of Tomlinson. Nevertheless, such change exists and continues to take form.

Medicine is no different. It just stepped forward a little more cautiously. Indeed electronic messaging, particularly, email, is not a "new" medium by current standards, but its use and application in a field which prides itself on face-to-face communication, physical examinations, and mandatory office visits presents challenges and concerns from not only a practical point of view but a financial, legal, and efficacy standpoint as well.[81]

Many have examined how media itself has transformed society. Marshall McLuhan's notion of the "Global Village" (1964) seems almost prophetic as multi-media health channels such as Personal Digital Assistants (PDAs), Electronic Health Records (EHRs), secured patient portals, and tele-visits ("eVisits")[82] now flourish, promising travel not only across local, state, and national lines but across continents as well. [83] Though often upstaged by these and other telemedical technologies, the use of electronic messaging between physicians and patients has 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

[81] The full discussion of laws, acts, and programs associated with this medium is found in Chapter 2.
[82] This term, "eVisit" is used by UPMC's original and current 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.
[83] The telemedical industry has surged as telerobotic surgery even in rural areas becomes commonly advertised on billboards and as visual physicians' visits link remote areas of the Hawaiian Islands together almost instantly (Berry & Dolan, 2008). The focus here on electronic messages is not meant to upstage these advancements; rather it is to say that the transmission of these messages, through the Internet, enable 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).

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 current 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.

3.1.1 Electronic 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)[84] is 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, p. para. 4).[85] This does not include non-contractual

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[84] It must be noted that the Kane and Sands guidelines of 1998 referred specifically to email, but their information applies directly to current 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 allows for the same spontaneity, immediate response, permanence of records, and linear communication and discrete, digital correspondence. Current video exchanges through such things as FaceTime or Skype are less permanent and more continuous (analog). These forms of communication were not yet part of mainstream communication in 1998. However, as online video communication emerges between physicians and patients, that conversation has the potential of being recorded and made more permanent as well. This might be a standard factor of eVisits in the near future. Again, technology changes not only from year-to-year but month-to-month and day-to-day as well.

[85] This stands, in my opinion, 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. When I was 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

relationships, basic online discussion groups, or public forums. This does, however, include all Medical Advice, treatment, and information exchanged professionally between physicians and their patients through electronic interactions. These may use encrypted or unencrypted messages that are transmitted online or through text messaging on cellphones.[86]

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 allows for a free-flowing, present-based, natural means of communication. It encourages immediate expression of thought without regard for the time of day or the physical presence of the receiver. Its spontaneity is both its benefit and its danger; for a person may write a note in a moment of anger, trauma, or sentiment and then send that expression without ever being able to "take it back." Words indeed may be spoken in the heat of emotion; and, because of their closeness to the unguarded, natural experience itself, such expression in fact can be more revealing than the more rehearsed words of a written speech or letter. Physicians who receive such a note gain first-hand insight into their patients' mental state in the midst of a problem--something that rarely happens in the often artificial and sterile environment of an office visit. Too often patients *recall* their emotion but do not record it *as* it is experienced, a much more valid observation. Therefore the spontaneity of the electronic message has the potential of capturing patients' experiences in a

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$40 per year. Now the encryption is 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 use 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 has to do with communication through unencrypted *text* messages. As yet there are no effective, popular means for messaging outside of the secured portals for use with texting between physicians. These examples reveal the level of continued applicability of this seminal work by the AMIA as reported by Kane and Sands.

[86] All messages exchanged electronically that do not use encrypted services are automatically in violation of the HIPAA laws and regulations. Physicians and patients do make such exchanges; but they are in violation of the laws designed to protect the privacy of the patient and can be subject to strict fines. See Chapter 2 for further information regarding HIPAA laws and privacy.

more primary and direct manner than formally prepared messages.[87] Granted not all electronic messages are delivered in such a stream of consciousness state, but they do in fact have the *potential* of being created and transmitted in this manner. It is this very characteristic that makes this medium similar to the spoken word. In contrast with speech, however, the electronic message captures in writing patient's thought process at any time of day no matter if the receiver is available for response or not. Physicians do not have to be in their offices or "on call" to hear the patients' tone of voice in the midst of the experience.[88] Messages can be relayed without the mutual physical presence of an office visit. Time and even place are not factors. The electronic messages, therefore, allow for unrehearsed, imperfect, natural, introspective, emotional, and spontaneous thoughts to be captured as they are experienced.

Once words are spoken they can be forgotten, vaguely recalled, or remembered differently by each involved party. Once words are sent through electronic messages, however, they are recorded word-for-word. They can never be taken back. They remain forever retrievable in cyberspace (or in the electronic chart of the secured portal). In contrast, because of its dependence on human memory, oral conversation can be relatively transient. It depends upon the practitioners' memory and transcription for the actual recording on a chart (electronic or paper) of the information that is spoken. There is always the possibility that the message may be

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[87] For this reason, psychiatric services are becoming increasingly more popular online not only because of the round the clock access but also because of the convenience for both the patient and physician in many cases. 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)

[88] If the experience, however, is a "crisis" or medical emergency, it should be dealt with immediately through a phone call or trip to the emergency room. As discussed later, electronic messages through email are not designed for this. Also, some might argue that tone of voice can be recognized through emails with emoticons and the words used. This is true, but emails do not afford the visual aspect of a face-to-face interaction.

inaudible, misinterpreted, or inaccurately transcribed. A patients in their physicians' offices might be asked questions that force them to recall what they had felt at a specific point in their history. Presumably, if the electronic message is sent at the time of the felt experience, then the description might be more primary (to the source of the experience) as opposed to being clouded by memory when the physician elicits recalled information. The spoken word depends 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 are always word-for-word and enter the medical chart as such. Oral messages require accurate listening, interpretation, and transcription of what the patient said. Indeed they can be retyped or revised as they are written, but once they are "sent," they are irretrievable.

Uniquely, electronic messages can be as spontaneous as the spoken word yet even more permanent than the written word in hard copy form. Once the "send" button is pushed, electronic messages can be saved not only in an electronic folder but copied and saved in a paper chart as well.[89] They instantly become part of the permanent medical record of the patients' mental and emotional state and medical condition at the time of delivery.[90] No matter how formal or informal, how intentional or unintentional, the electronic message captures the patients' personal experiences and transforms them into a legal document whether or not it is

[89] In a 2009 personal interview with Drs. Jerry and Patrick Gray, they discussed their very early transition into electronic health records when they left a previous practice and opened a new office. Due to 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 electronic medical record. That is, the hard copy was copied into electronic copy making the potentially destructible paper charts indestructible electronic ones. For more information on the Gray Medical Associates' practice conversion and similar interviews, see Chapter 4.

[90] Of course 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.

forwarded to the paper or electronic chart (Spielberg, 1999; Terry, 2001). Whether electronic messages exist in hard copy and/or somewhere in cyberspace, they are permanently retrievable and virtually indestructible. Indeed letters can be lost in the mail, burned in a fire, or ruined in a flood, but electronic messages are never really destroyed. In this sense they are even more permanent and protected than paper messages.[91]

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 create and send electronic messages are responsible for the content and format in which the information is sent. They may cathartically release an emotional message, tone it down, revise it, or simply delete it without ever conveying it in its original form. Once sent, however, the messages become part of the patients' permanent medical history.[92] The patients have the right to review or get a copy of the recorded data; but they cannot 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 is "there" because it potentially still could be retrieved from "trashed." These deleted files are never totally removed from the computer. There are companies devoted to retrieving such files often for legal purposes; therefore, no message is ever really lost.

Ancillary staff members including office secretaries, nurses, and partners within physician groups still have access to the recorded information similar to how they do with any

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[91] Again, this discussion only looks at written online communication and not visual interactions. The latter will, however, be considered and discussed later in this dissertation in light of eVisits in particular. See Chapter 5.

[92] For this very reason, some voice 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) has commissioned the National Academy of Sciences to research and implement procedures for adding more social and behavioral data into the EHRs in an effort to meet the growing demands of the Stage Three of Meaningful Use. See http://www.ihealthbeat.org/articles/2013/9/16/cms-commissions-study-on-including-social-behavioral-health-in-ehrs.

medical, hard-copied chart. Similarly with hard or electronic charted messages, all have 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 patient health information (PHI) without the permission of the patient or a direct requirement of the healthcare position is a direct violation of patient privacy.

As discussed earlier, the HIPAA laws intentionally regulate the security of all electronic and written messages about patient health. Security of electronic messages due to their accessibility and permanence indeed is a serious issue. Both those who create the message and those who have access to this transmission, therefore, must realize the inherent responsibility of viewing, sharing, and using this information. Responsibility for maintaining secure, protected information exchanges, therefore, lies in both the sender and the receiver of the message as well as with anyone who has access to the original electronic message or medical chart.[93]

In short the spontaneity, permanence, and information power characterizing electronic messages between physicians and patients play a significant role in the decision of whether or not to use them as part of each medical relationship. Patients have the choice as to whether or not they wish to utilize this medium. Physicians, on the other hand, must 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." Indeed this medium allows for interpersonal interactions; but the real issue is how these interactions have changed over time and to what extent this change has affected the physician/patient relationship.

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[93] See Chapter 2 for a discussion on the HIPAA laws and regulations associated with recording and PHI privacy regulations.

3.1.2 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 has not always prevailed. In fact current developments in technology such as the electronic messages in some ways parallel 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 act 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 though face-to-face interactions by making house calls or having patients come in to 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.[94] 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.

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[94] This perhaps is a precursor to the "eVisit" of HealthTrak. See Chapter 5.

267). The written word was considered to be 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 1960's 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 now this notion continues 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.[95] In a way this objection to print and online medical information is the same. It reflects an attitude by some physicians, past and present, that the profession belongs to those who have formally studied it without help from the patient who has 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 ones 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 can be cause for alarm. The accessibility of professional information in print or online, was and even is considered to be only for the eyes

[95] 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.

of those who studied (and therefore controlled) that information. The cases are quite similar; the media is what has changed. The fear is that information will land in the hands of the wrong people who are not capable of properly deciphering what is accurate or not.

Once physicians adapted to the presence of print media in the hands of patients, it did not seem to be as great a concern. It can be assumed that the same will hold true for the electronic medical resources as well—especially when one considers the introduction of the electronic medical records, which not only provide general medical information but now provide the specific record of the physician about the patient. In effect it is the medium (print vs. electronic) that creates 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. Perhaps this will be the same case once physicians get used to (or even encourage) patients to bring in materials from the Internet and/or once they become accustomed to patients being permitted to seeing their own electronic charts. Again, the concern may be resulting from the newness of the medium in its ability to transmit information more readily than from the information itself.[96]

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

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[96] It is not the purpose of this dissertation to discuss the legal rights of patients to their own medical or electronic charts. However, the point is being made here that the medium (EHRs) has afforded this increased visibility of information that was once owned only by the physician. For additional information on research involving "open notes" for electronic records, a longitudinal study is being done by the Robert Wood Johnson Foundation concerning the change such access may or has made in patient care. See http://www.rwjf.org/en/research-publications/find-rwjf-research/2010/07/open-notes.html (Delbanco, et al., 2010).

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).

Again, as WebMD and Medscape increase in popularity and acceptance, today some physicians encourage patient education through their own office or hospital websites which provide access to controlled information relating to individual patients' particular illnesses. In fact as patient portals have become mandated through the Stages of Meaningful Use, more and more systems provide this information automatically through direct emails to the patients.[97] Other physicians actively exchange medical information through electronic messaging by forwarding articles and websites relating to patients' individual illness, treatment, or general medical history. This use of the electronic messages containing web-based information resembles that of the book but outweighs its effectiveness due to a more rapid and widely spread transmission of information that may reflect more current news and research discoveries. Much that is accessible online is not yet available in print. Therefore, the potential speed, efficiency, and state-of-the-art quality of the information transmitted through electronic message by the physician may allow for well informed, up-to-date patient educational practice. This enables the physician to act as a personal *resource* of medical information in *guiding* the patient towards authentic web pages and refereed professional articles. This may also allow physicians to better

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

control the accuracy of the information that is now abundantly available to the public (as many online sources may lack accuracy and credibility). Whatever the case, electronic distribution of medical information and messages have 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 mediums for information exchange may be used as regularly and reliably as print media

Historically, the “new” media of the telegraph, telephone, and even print itself have been received by popular culture with similar hesitation. It is no wonder that cautioned acceptance of the electronic message parallels 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 remain a concern of physicians. Historically, anything “new” anticipates problems. Nevertheless, emails, like print resources, telegraphs, telephones, and most technological advancements, through time do become accepted, adapted, and utilized in ways that meet the needs of society.

Unlike previous forms of new media, electronic messaging has yet to make the pivotal turn towards full acceptance by physicians and patients alike. 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 remain with issues of efficacy, privacy, time, malpractice law suits, 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 feel almost pressured into using electronic messaging as if by not doing so they are missing the benefits of the medium or being 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, it is likely that some physicians perceive the computerized office as a "nuisance" while others embrace the technology and forge ahead, testing the benefits and searching for still newer ways to facilitate optimum patient care. At the same time, some patients may not embrace the use of computerized charts and online communication with their healthcare providers. Some may be resistant to the use of any form of electronic communication due to lack of Internet access, finances, technological skill, or basic literacy. Some may fear privacy issues.

In all, the introduction of this relatively new medium of communication into the medical community elicits a strong socio-technological response from its users: both patients and practitioners. The medicological environment remains unsettled as some choose to adopt while others resist, as some question security issues while others argue that if it worked in the banking industry it should work in medicine as well, and as some feel technology will potentially replace direct physician face-to-face access while others believe it will allow for more continuous and accessible care. Resistance is expected; change is inevitable.

3.2 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 *mediums*[98] available for transmitting electronic information continue to evolve over time and that (2) both the physicians and patients mutually affect and are affected by these changes. In a sense this entire transformative climate forced the public to respond to this change—like it or not.

3.2.1 General Public Response Patterns: The Emerging Climate

Indeed change already was in the making by the early 1990's 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.[99] The term "smartphone" itself was coined with the introduction of Ericsson's Penelope GS88 in 1997.[100] The Apple iPhone and the LG Android[101] came into

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[98] As stated earlier, the choice of using the term "mediums" as opposed to "media" is purposeful in that a strongly media ecology perspective is herein taken to set apart the definition of "media" as a specific form of public entertainment such as a radio or TV show as opposed to the space through which messages are being transmitted. Meaning is derived as much through the message written/spoken as it is through the medium itself. As Marshall McLuhan so popularly stated, "the medium is the message" and therefore when various mediums are used, various messages of the same content can be delivered while implying multiple different meanings.

[99] 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 quiet unaffordable and impractical price of $899.

[100] 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/.

popular play beginning around 2007.[102] 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 over simplification. 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 single handedly 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

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[101] "LG" is the company that produces Android. The acronym stands for "Life's Good."
[102] For a chart comparing Android and iPhone popularity and development go to http://www.ijailbreak.com/news/iphone-or-android-phone-first-infographic/

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 in section 3.3 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 helps 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 reflects the existing demands of the public's desire for online access, but it *creates* an even greater need for it. More specifically, it may be assumed that as more and more people realize the availability and convenience of online medical communication, they indeed may increase their own amount of online interactions because of experiencing the effects of this new application.[103] For instance, if a psychiatrist treats a teenaged patient through a virtual eVisit that utilizes the medium of FaceBook or Skype, it might more effectively enable 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) influences its overall user-friendliness and -attractiveness. With public media dissemination of such "rewards" within healthcare, the medium therefore has the potential of becoming more acceptable and perhaps even more desirable. Therefore, the perpetuation of the medium in healthcare may very well increase the usage of the medium itself (with or without medical information as the content of that message)

[103] And of course the reverse may happen too if problems emerge when using the medium.

within the medicological environment. With or without medical content, the technological environment exists; but the medicological environment (which includes health-related content) affects and is affected by this environment while interacting with multiple other environments as well (again such as legal, political, economic, social, and so forth).

In short, as stated earlier, the IOM states that patients have the *right* to communicate through various mediums 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 finds itself curiously exploring new health-related technologies through the mediums of the computer and smartphones alike. Indeed 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 or not the President realized the actual extent of his sweeping proposals which helped create the impetus for new forms of technology and more wide-spread, accessible Internet services. The system sustains itself and thrives. As technology evolves, so does the medicological environment; and with this evolution, so do all the other players within this environment also evolve.

As stated earlier, although "email" through secured health portals has been named one of the key "new" forms of physician/patient communication, it is but one of many related mediums that allow for electronic health communication. The smartphone, for instance, acts as a telephone, a texting mechanism, and a computer for Internet access. By using the Internet on the smartphone, phone calls can be made and text messages transmitted without using cellphone "minutes" but instead using Internet "data" (as when using the iphone/ipod application, "Viber"). The physician can be reached by phone, texting, email, FaceBook, Instagram, Snapchat, or

Twitter (adhering to HIPAA regulations or not) all through the same smartphone that draws from texting allowances, cellphone minutes, and/or Internet data allotments, depending on which is preferred.

Again such multi-purpose uses of the same medium transform the notion of separate communication spaces into continuous, multi-channeled mediums, a concept best described by Bolter and Grusin (1999) as "remediation." If "a medium is that which remediates," then all the mediums 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 created therefore creates an environment that transformatively utilizes these interrelated mediums to the point that one cannot 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 continue to improve upon themselves and all prior technologies. These forms of media thus refashion old media and begin to take on each other's characteristics as forms of human communication (McLuhan M. , 1964). In effect, over time all mediums used to transmit information between patients and physicians become extensions or remediations of other forms of human communication (as in "face-to-face" communication through Skyping during virtual eVisits with physicians). The point is that the medicological environment provides a "hotbed" of continuously morphing technologies that adapt and reconfigure old technologies into "new" mediums of communication. Again the best example of this is the "old" technology of the telephone being transformed into the cellphone and then the smartphone. With each transformation the applications become more overlapping and complex and in effect closer to other forms of media.

While these multifaceted usages exist for many users, some technologies are limited in accessibility to some members of the population due to various superimposed restrictions. Due to location, socioeconomic levels, education levels, media literacy, and learning impairment, many in this country may not have had the opportunity nor means to become avid Internet users. Time, cost, and familiarity certainly have a profound effect on adoption. Despite these apparent roadblocks, availability has begun to increase significantly as access to the Internet improves through the FCC Broadband expansion to rural areas, as free services in public places such as libraries and senior centers emerge, and as the Lifeline government-funded cellphone program for low income Americans helps even the underprivileged obtain cell phone access to Internet and electronic messaging services.[104]

In short the public response exists 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 mediums (such as the smartphone) and then accelerated with the recently mandated EHRs promoted by the Obama Administration. Again, it is important to emphasize that this change simultaneously affects *both* the physician/provider and the patient/consumer in this medicological environment. Finally, it must be further noted that physicians often are also patients and find themselves at times in the consumer role, experiencing the very same

[104] Much controversial publicity has surfaced surrounding the Lifeline services for what many call "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 cellphones. 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 can obtain this "free" cellphone service that is funded by government-collected telecommunication fees, paid for by consumers.

challenges as their patients.[105] Indeed, multifaceted influences and remediated mediums exist simultaneously within this transformative space.

3.2.2 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 post-HITECH Act environment, but it would be erroneous to surmise that the flow of new technological advancements weren't already in place well before the 2009 enactment. Instead the enactment hastened the progress towards sweeping change.

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[105] *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.

To begin with, according to the Center for Studying Health System Change'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 72 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 improve 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 trail their younger counterparts with only half of those age 65 or older (48%) seeking health information in 2007 up from 31% in 2001 (Robert Wood Johnson Foundation, 2008). Indeed health literacy rates suggest 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 have internet access at home, 47% have email at home, 30% rely on friends or family outside the home for access, 15% share email accounts with family and friends, and only 12% neither use nor have access to the Internet or email. This 12% unfortunately represent the patients at risk who find themselves marginalized in this digital world. In short, due to access, literacy, and economic factors, the rural, low-income, elderly, and African-American consumers are not as likely to have access to the Internet and therefore do not utilize emails (Liebhaber & Grossman, 2006). The "knowledge gap" among the "chronically uninformed" is 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) requires a much higher reading level for comprehension of web-based health information than do most other published health materials. The barriers preventing effective online communication with patients exist for some populations more than others. Therefore, since medical practices span groups of such diverse backgrounds and abilities, it is vital to remember these barriers in determining to what extent emails should or should not be used as a means for communication in the healthcare setting.

Despite these significant cultural and subcultural differences, the majority of the American population that chooses to interact online indicates that it is important to determine to what extent emails are 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 6 area clinics (33-75%) reported having email access with 90% of them using it for prescription refills, 87% for non-urgent consultations, and 84% for routine laboratory results or test reports. This means that over half of the population sample of 1000 was actively using email as a part of their medical routine. These results are quite remarkable overall but appear to reflect a population sample that likely is relatively more urban and progressive in its use of technology. In fact this study indicated that 3 out of 4 of the participants who used emails expected a response on their lab reports within 24 hours. This reveals a response time that is even tighter than current standards for most secured portals which typically advertise a 48-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 desire 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 are skeptical of change need 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 be 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 towards 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 in effect adapts when external forces invade the system, driving it towards change.[106] 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 recreate the ever-changing medicological environment. At any given point in time, change elicits a response, alters the environment, and in turn recreates or readjusts itself. Therefore, no two observations of this environment are ever exactly the same. Rural America from a medicological standpoint is affected by the internal environmental 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 towards an equilibrium or period of settling in to the change as it becomes the norm, until more change and more outside and inside forces alter the a space (such as a new technology or advancement).

Clearly, there is a distinct difference between rural and urban populations not only in their accessibility to the Internet but their receptivity of such new technology in medical settings.

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

This is evident in the fact that even current adoption of the EHRs towards Meaningful Use allows for an exemption with the claim of "hardship"[107] when rural areas without adequate Internet connectivity are involved. The hardship of course has more to do with the physician practices and hospitals than it does with the patients themselves. That is, financial restrictions and penalties cannot be forced upon physician practices and hospitals if they have no means for acquiring Internet for their patients or even themselves. Technological limitations outside the control of the physicians remove them from such accountability. If physicians cannot provide the service, the patients cannot use it. Meaningful Use mandates are therefore made irrelevant in such cases.

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

3.2.3 Early Response Patterns of Physicians

Similar to response patterns of patients, the physicians for the most part show 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

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[107] As noted previously, "hardship" is a term used in reference to physician practices and hospitals that cannot be financially penalized by the government when the ability to meet the Meaningful Use mandates is 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.

formally educated physician. This may have been true for those physicians polled indiscriminately along with the public,[108] but this is 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 surface in a wide variety of research studies examining physician response to this changing medicological environment.

3.2.3.1 Early Implementation Data

As previously noted, if physicians adopt the medium of electronic messaging, then patients are more likely to follow because the opportunity for using this form of communication is made available to them. It is logical, therefore, that 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 towards change is surfacing within the physician population. As the climate in healthcare prepares for the transition into electronic medical communication, the literature prepares for the physicians' *use* of this medium by addressing the many potential pitfalls, precautions, and scenarios that could happen once implementation occurs. Research likewise addresses the overall lack of physician acceptance and the undercurrent of skepticism.

According to The Center for Studying Health System Change (HSC) research (Liebhaber & Grossman, 2006), there has been a 4% increase in physician emailing with patients from 2000-2001 (20%) to 2004-2005 (24%). Comparative analysis of physicians' ages between the two

[108] To the knowledge of this author, 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.

time frames show that 18% - 20% of those younger than 35 use email, 21% to 25% for those 35 to 54, and 17% to 25% for those older than 54. The HSC concluded that this is 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 50 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 use emails only 7% of these use them routinely compared to the 17% of patients who email their physicians, of which only 3% of this group do so routinely (Paulsen, 2006).

3.2.3.2 Early Guidelines for Online Interactions

This striking lack of overall adoption comes 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 1900's at a time when Internet service, cellphone 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)[109] 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, Kohan, and Brant (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! Amazingly these guidelines make clear, relevant recommendations even applicable to today's standards.

There are two basic concerns outlined in these guidelines concerning physician use of email: (1) the effective interaction between the physician and patient and (2) the need for medico-legal prudence. Both points continue to permeate the majority of medical research in this area even today and, because of this, need to be thoroughly addressed herein.

Effective email must improve not complicate the physician-patient relationship. According to the AMIA guidelines, (Kane & Sands, 1998), emails rely upon a negotiation between the patient and provider with the emphasis on turnaround time, privacy, permissible transactions and content, plus discreet and 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 stipulates 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

[109] See Chapter 2 for additional information concerning Kane and Sands' article. Much discussion of this set of guidelines is contained throughout this dissertation due to its remarkable detail, foresight, and thoroughness in predicting problems associated with this medium. In fact the standards discussed throughout this document remain important today even though they were created prior to the HITECH Act of 2009.

electronic medical record; 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 insure privacy; and emotional content must always be left out of the email (including emoticons) to avoid misinterpretation. These and other instructions make the process of emailing very clear and are 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, extends far beyond laborious lists of warnings which placate (or inadvertently call 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 outlines benefits of email over the telephone: The telephone is 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 reach 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 must of course be handled with care to assure such benefits. HIPAA regulations state that email messages should be encrypted to prevent breaches of information or interception of data. Even small physician practices can use software such as Pretty Good Privacy (PGP), but the patients' computer must have the same software which can be downloaded off of the Internet. A secure password shared between the physician and patient enables both to have access to the medical data. Another possibility is a secure server messaging service such as Healinx which is a hybrid version of online communication. Similar to sending an Internet greeting card, the patient goes to a third party server that is viewed as a Web page (Morach, 2000). Either method enables legal documentation between the two parties both for the physician's security as well as 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) states, 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 are paramount (Mandl, Kohane, & Brandt, 1998).

Such a risk and time commitment by the physician has 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 have been made as identified by *The Physician News Digest* (Guadagnino, 2008) which lists 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 indicates a serious shift in favorability towards email use in physician-patient communication.[110]

Granted, much of the interactions with medical offices have to do with billing or scheduling issues which may be handled through the office secretaries. However, when email is used between the physician and patient, it becomes a medical document and, in turn, a potential liability for the practice. From this standpoint, the email creates 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 (AMA) Council on Ethical and Judicial Affairs' report titled, "Ethical Guidelines for the Use of Electronic Mail between Patients and Physicians" and adopted in December of 2002 (American Medical Association, 2003),[111] emails are not to be used to *establish* a patient-physician relationship but should only supplement other, more personal encounters that take place during office visits. This clearly indicates that the AMA's recommendation of email usage is restricted to professional interactions that are recorded and later placed in the patient's permanent records rather than to relationship-building, interpersonal messages.[112] Such restrictions parallel the standards of face-to-face office visits and therefore have the potential to be charged when services are rendered. The email, in this light, is looked upon first as a business not a relationship-building medium and therefore can be associated with an appropriate fee. Some may question this logic by arguing that interpersonal interactions on

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

[111] 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.

[112] 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).

line 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.

3.2.3.3 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). 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.[113] A healthy, satisfied,

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[113] 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 particular 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 private dinner parties. The problem to physicians is real and worthy of concern. See also personal interviews with physicians in Chapter 4. See also brief discussion in this section.

trusting relationship between the patient and physician remains the paramount concern (Leong, Gingrich, R., Mauger, & George, 2005).[114]

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 Institute of Medicine (Institute of Medicine, Committe on Quality Health Care in America, 2001) has issued the following statement: "Patients should receive care whenever they need it and in many forms, not just face-to-face visits." This implies that the healthcare system must be responsive at all times 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). Whether it is direct, person-to-person, or mediated through a computer, the key to a trusting, effective relationship involves multiple levels of communication, including but not limited to, email or other forms of electronic communication with patients.

Physicians adhere 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

[114] 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 towards 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.

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 mediums 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 places a high demand on physician time and focus; but it simultaneously allows for a fundamental transformation of how the medical profession views the physician/patient relationship and the nature of responsibility of care within this medicological environment.

As stated in the previous section, 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 is how rapidly and forcefully this change would occur when healthcare not only accepted it but was required to use it—ready or not.

3.3 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.[115] 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 pre-existing 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.[116] 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).

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[115] Many articles have flooded the *NY Times* concerning the Affordable Care Act and HITECH Act since 2009. Opinions run from concern for "death panels" to praise for "equal opportunity" of care for all. Some see the fiscal and economic consequences as positive and some as negative. Both sides of the argument are 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" summarizes these views quite well. Go to http://economix.blogs.nytimes.com/2013/10/14/the-hurdles-to-success-for-the-affordable-care-act/.

[116] This entire rhetorical focus, though fascinating, is purposely only mentioned herein as this dissertation deals more with electronic mediums and emails than the entire argument concerning fairness and appropriateness of the Affordable Care Act. The reason it is mentioned, however, is because this response is/was part of the climate, the medicological environment of that period. The rhetorical argument concerning the connotations and messages surrounding "death panels" deserves to be a separate topic for study in and of itself.

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. Indeed the medicological environment exhibited strong political divides particularly in reference to the Affordable Care Act. 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 in particular. To clarify this concern an example may suffice.[117] To begin with, a basic EHR system (necessary to even start the first stage of implementation) costs 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 (includes management fees and support). Over a five year period this amount averages about $48,000 to $58,000 respectively for each physician in the practice. These are basic costs that include hardware, EHR software, implementation assistance, training, and ongoing network fees and maintenance. (HealthIT.gov, 2014). Of course these costs are to be supplemented with

[117] Portions of this discussion were covered in Chapter 2; however, there is relevance in calling this to mind for the reader at this specific point in time to help clarify and reinforce the concept of "response."

government "incentives" if a practice adequately meets 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 is possible (cms.gov, n.d.).[118] When considering the upfront costs to the individual physician, the fact that many physicians try multiple EHR systems before they chose one, and the time, energy, and practice costs for employees; this entire process promises to be quite financially demanding on physicians, especially solo practitioners who have to cover these costs directly out of pocket.[119]

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,[120] and (3) all later Stages for Meaningful Use had merely been *outlined* with very broad requirements and a "to be determined" status. In fact even as this document is being written, the Stage Two Meaningful Use requirements continue to be challenged and altered even while Stage Three requirements are 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 feel

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

[119] As noted earlier the startup costs for my husband's practice (J. Eric Wieczorek, MD) was about $70,000 for the vendor Allscripts. Costs continue to surmount as each update of software is added and each new requirement for Meaningful Use comes up as in the most recent fee for training and implementation of our new portal which ends up costing the practice about $5,000 over the past year and will continue to incur a monthly administrative fee of about $70 per month. This is but one real example of how costly this endeavor is to solo practice. See Chapter 2 for further information.

[120] Please see Chapter 2 for references and websites that support this summary.

confused and somewhat at a loss over whether or not to make this transition or suffer the consequences.[121]

For older physicians, this latter option is a valid one in that by the time they purchase the technology, train their staff, and adapt to the new EHR system themselves, they may very well retire. It simply is not cost effective and not worth the time and effort to a physician anticipating retirement. The threat of government penalties for those who choose not to comply seems less costly than what it would take simply to pay out these penalties or even worse quit practicing medicine altogether. This in turn threatens to decrease the already dwindling number of physicians in today's volatile market.[122] This spiraling effect erupting in this environment existed in 2009 and remains a challenge today.

As Baron argued in the *Journal of the American Medical Association* (2010), "Physicians encountering a new technology such as electronic health records (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 boils down simply to "managing information," and that information takes time to manage when a new medium is involved with relatively inexperienced users. Additional possibilities may unfold after the new technologies first meet

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[121] I personally read a wide variety of health information technology reports every single day. These are not only provided by my vendor (Allscripts) and first secured portal (Medfusion) and new secured portal (Follow My Health), but also provided by various online information sites such as iHealthbeat and Physicians News Digest. Change is so prevalent that it could easily be a full-time job trying to keep up with all the fluctuation, new mandates, and requirements that keep coming up for each year and Stage of Meaningful Use. Once committed to this process, it also feels as if one is bound by it as so much money is invested into it, that it is difficult to go backwards and suffer the financial consequences. This certainly is my opinion but in speaking with many health professionals daily and reading many blogs, I have found in general that this viewpoint is not a solitary one.

[122] It may be helpful to go to the following link for additional information: http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/PaymentAdj_HardshipExcepTipSheetforEP.pdf. Again, 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.

the old needs.[123] Once medical data is digitally recorded, the required phases of Meaningful Use naturally follow with electronic messaging being an intrinsic part of that transformative process. Perhaps it is that simple. However, implementation when combined with the multifaceted components of the medicological environment, is all but simple. Adaptation may seem slow in coming; but it *is* coming nonetheless. And both groups, the physicians and the patients, are part of this unfolding process.

To attempt to make sense of this complex environment, it is important to break down key components affecting and affected by these related parts. Alone, each in and of themselves are a challenge; together, they create a composite whole that forms yet another facet of the medicological environment of healthcare today. As an aside, it must also be reiterated at this point that although the EHR is not the primary focus of this paper, it must be examined alongside of electronic health messaging in order to appreciate how this forced implementation has provided the foundational requirement of electronic messaging (currently Stage Two of Meaningful Use).

3.3.1 Systemic Surge in Internet Use

Considering that Internet and cellphone usage continued to rise over the period prior to the HITECH Act of 2009, one could assume 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) is added into the mix, it is

[123] This echo's Carolyn Marvin's book, *When New Technologies Were Old* (1988). See below for further discussion.

likely that more people will use the medium once it is made widely available to the public and incorporated into everyday life.

The extent of this dynamic change is 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 is so remarkable about this statement is 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 allows for the greatest authoritative change in culture today, a sort of "Internet textuality" or "broadband textuality" that links a wide variety of communities that are 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 particular change has tremendously influenced the entire country (and world for that matter) in ways that are only beginning to be identified and appreciated. Technological advancements in healthcare plus widely accessible broadband (through multiple channels including the smartphone) equals a critical transition in how medicine is practiced, disseminated, controlled, researched, and accessed. Certainly healthcare alone is not the only thing driving the broadband push, but it is something that has hastened its implementation.

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

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

3.3.2 The "Health" in HITECH

When using the acronym "HITECH" (*Health* Information Technology for Economic and Clinical *Health*), sometimes the emphasis on "health" is lost in place of the more visually prominent portion of the acronym, "TECH," suggesting technology.[124] The term "Economic" jumps out too in equal measure with "Clinical" in the actual title, indicating this transition has just as much emphasis on U.S. economic factors as it does on the clinical side of health. The notion that health is "big business" is a concept few would argue, especially those in health related professions.[125] In this vast medicological environment, health, economics, technology, politics, and the like mesh together to create a very powerful impetus towards change. However, no matter how mixed this interest is, the primary reason for government focus on this transition into faster and wider Internet access is on improving *health* accessibility to members of the U.S. population. If active, accessible online communication and eventual virtual physician visits can 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 are, presumably, the more available (and even "affordable") care for all might be. At least that seems to be the assumption.

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[124] Certainly the acronym is catchy but it does not readily emphasize health as much as technology. It could have been called "HealthTech Act; but it was not. The attraction to "high technology" is 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.

[125] On a personal note, it might be added that I too have been "in the business" over the past 34 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-present). In no uncertain terms, all of my positions have been about health *and* economics. On Friday, June 27, 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 has 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.

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

In November of 2009, the Commonwealth Fund published "The Commonwealth Fund 2009 International Health Policy Survey of Primary Care Physicians in Eleven Countries" (Schoen & Osborn). In this report, numerous research studies were cited outlining how the U.S. 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 considered having "advanced electronic health information capacity." These functions were electronic medical records; 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, preventive/follow-up care reminders; and computerized list of patients by diagnosis, medications, due for tests or preventive care. The U.S. 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 U.S. (23%), Norway (19%). France (15%) and Canada (14%) on the low end. Additional studies concluded that there is a significant concern not only for the U.S.'s lack of IT adoption 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 is cautiously yet dangerously overlooked for the most part by the American Medical Association who realizes that the current demand on so few physicians could become greater with around-the-clock access to already overextended health professionals, namely physicians.[126] This concern must be held into account when looking at other countries. Yet again the U.S. falls short in comparison with the eleven other countries of the Schoen and Osborn report (2009) where the Netherlands came in first (at 97%) followed closely by New Zealand (89%), and the United Kingdom (89%). The U.S. fell to last place (29%) for having around-the-clock access. If the U.S. chooses to match the standards of other countries, this report shows it faces a lot of change.[127]

3.3.3 Evidence in Numbers

Change, however, is in the making. When comparing usage rates before, during and after the HITECH Act there is a continuous overall slide upward of broadband and smartphone usage. A significant jump, however, appears after implementation of EHRs and general online health communications.

3.3.3.1 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 have broadband connection in their homes, up from 5% in early 2006. Of all those using Internet in their homes, 70% have broadband and 23%

[126]This is discussed in personal interviews with physicians. See Chapter 4.
[127] Notably, this report came out in November of 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 where the U.S. had no desire to take a back seat to international technological advancements.

have dialup. In fact what is most striking is that it was not until about October of 2004 and February 2005 that the percentage of people using broadband exceeded those using dialup. Visually, the statistical curve crossed at that point with dial-up going down and broadband going up. More statistically speaking, in June 2000, 48% of households reported using any type of connection to check email or access the Internet compared to 47% who have broadband connection in 2007. As Horrigan and Smith summarize, “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 report that rural home adoption rates (31%) lag 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 have broadband connection at home with only a 9% increase since 2006. However, since 2005, the percentage of African American adults who have home broadband has 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 say they have attended some college, but have not graduated (23%). Also, key findings from the Latino group (who filled out their surveys in Spanish only) indicated that 56% of Latinos go online from any location which is lower than the rate of Internet usage among African-Americans (62%) and rural adults (60%);

that 29% of Latino adults have home broadband compared to 31% rural adults and 40% African-Americans; and that among Hispanics that have home Internet access, 66% have broadband compared to 70% of all Internet users. In short, the Latino culture fairs 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 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 shows a wide range of uses of the Internet as well as a significant trend in using it for giving and receiving emails.

In light of this 2007 Pew Report, a significant portion of the general population is using Internet, particularly broadband. Aside from significant disparities among various demographic groups, nearly half of the American public has access to and uses 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.

3.3.3.2 The Turning Point Statistics

As may be expected, various Pew Reports show 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 a 2009 Pew Research Internet Project on home broadband (Horrigan J.), adoption went up a full 8% within one year from April 2009 to May 2008 rising from 55% to 63% overall adoption. This rate of increase was more than double that of the stagnating rise between December of 2007 and December 2008 where only a 3% adoption increase occurred. Significantly the greatest growth in broadband usage occurred in both senior citizens (those 65 or over) with a 30% increase and 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 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 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 Horrigon (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 of 2008 to $39 in April of 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 is perceived as a more valued means of communicating than watching TV or talking on the cell phone. The Second issue is that

Horrigan does 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.[128]

Even though he does not mention this, he does 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 their community" (68%) and "communicating with healthcare or medical providers" (65%). Fascinatingly, people who choose to purchase and use home broadband do so largely because they want to know what is going on around them and they want 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 U.S. 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 as

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[128] Numerous programs have been noted throughout this document, particularly in Chapter 2. Again, 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 (of all things) that began circulating in 2009 and warned that free "Obama phones" were being handed out to welfare recipients along with 70 minutes of free service a month. This contributed to wide-spread 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.

well as 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 provides 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.

3.3.3.3 Post-HITECH Statistics

3.3.3.3.1 The Critical Age Factor

Zickuhr and Madden (2012a; 2012b) produced two related Pew Research Internet Project reports, both dated June 6 and both mainly covering Internet use with a highlight on age comparisons that focused particularly on older adults. One may ask why a key focus on age is being singled out by Pew Research teams. Although interest in older adults is significant in a broad sense, it is 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 represent the larger patient population (particularly in areas of primary care such as Internal Medicine and Family Practice), then exploring whether or not this group uses the Internet is critical. If only young, healthy consumers use the Internet and they are the ones who utilize the healthcare industry typically less often and with less complex and life-threatening problems, then why would physicians have to communicate online if their largest population is "too old" to use the Internet? This particular argument is a valid one and appears 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,[129] older adults are actually one of the fastest rising populations to adopt overall Internet use. This rise of use promises 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 provide 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 ages 65 and older are online
- Once online, most seniors make Internet use a regular part of their lives.
- After age 75, Internet and broadband use drops off significantly.
- Seven in ten seniors own a cell phone, up from 57% two years ago.
- One in three online seniors uses social networking sites like Facebook and LinkedIn.

Strikingly, these conclusions reveal that older adults are not only being introduced into the world of electronic messaging, they are adapting to this new form of communication quite well and apparently even liking it. If these statistics indicate a trend, then demands on healthcare professionals to use the online messaging medium will become more than an option but possibly a preference. Likewise, as people age and perhaps become disabled, there is always the possibility of a surrogate communicator online such as a younger adult who can act as the designated online communicator. This latter possibility is quite likely since already many young adults act as spokes persons or "medical powers of attorney" for their older loved ones. This

[129] Again see Chapter 4 for oral history interviews and related references concerning this point of view. Chapter 5 also shows this perceptual trend in the new research study conducted on UPMC Internal Medicine patients from Montefiore Hospital.

being said, if the door is opened to younger participants who already actively engage in online messaging, the gap in the statistics for those over age 75 may be compensated for through this designated and legal role.[130] Just as some elderly people want and need a legal medical advocate to sign documents and make important medical decisions in person, some also need and want someone to communicate for them online. The point is, the increase in online communication identified in this 2012 Pew Research study may technically be even greater when considering online patient advocates who are already quite familiar with electronic messaging. Either way, the door to the older population's use of electronic medical messaging within secured portals of the EHRs, is certainly wide open.

More specific information concerning Internet patterns are outlined in the main Zickuhr and Madden article (2012b), which shows a detailed comparison between the older adults and their younger counterparts. To begin with, as generally stated above, 53% Americans ages 65 and older use the Internet, not just by happenstance but in a purposeful manner.[131] In examining the number of American adults ages eighteen and over who use the Internet between 2000 and 2012, in every age group there is a significant rise with the sharpest assent in the 65+ category over the past year. Specifically, in adults ages 50-64, now 77% use the Internet. Furthermore,

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[130] 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.

[131] This activity level is 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 results 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 shows a tightening in how this data is being acquired, and hopefully allows for a more representational sample of Internet usage.

82% of all adult Internet users go online in an average day with 76% ages 50-64, 86% ages 30-49, and 87% ages 18-29.

Gadget ownership by age group is another measure of how engaged the older population is by comparison. Four groups were examined in the following age categories: (1) ages 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 2 at 94%, 3 at 87%, and 4 at 69% as well as in the area of laptop ownership (75%) followed by 2 at 69%, 3 at 57%, and 4 at 32%. However, when examining the category of e-readers and tablets, all groups were significantly down with group 3 (age 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%, 2 at 23%, 3 at 16%, and 4 at 11%. For tablets, group 1 was at 20%, 2 at 26%, 3 at 14% and 4 at 8%. These numbers reveal that in all categories e-readers and tablets are not as popular for Internet access and that older adults do in fact use these gadgets and use them almost as much as their younger counterparts. Much larger differences exist between younger and older users in the categories of cell phones and laptops than exist between the various age groups in the categories of luxury gadgets (e-readers and tablets).

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

Finally, even more significant than social networking is 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 engage in emailing across the board with 91% ages 18-29, 93% ages 30-49, 90% ages 50-64 and 86% ages 65+. Even though younger individuals may use such social media a Facebook or Twitter more for quick electronic messaging than they do for emailing, emailing is still highly used by all age group sources with the 65+ population apparently using the medium mostly for this purpose. Of course these numbers are somewhat deceptive in that they are describing the type of Internet usage as being emailing but they are not saying that 86% of all those in the population of ages 65+ are using emails. Perhaps better stated is that of the 70% of Internet users ages 65+, 86% of that 70% use it for the purpose of emailing.

That is, minus all the numbers, if the majority of the older patients who represent the largest portion of healthcare users are communicating through email, then it appears that this population, once introduced to the online secured portals (individually or through patient advocates) will be very active users. If this is true, physicians indeed will have a substantial need for online communication once this medium in healthcare becomes as popular as it is in general everyday life for this age group of patients.

3.3.3.3.2 The Mobility Factor

Another Pew Research Internet Project report came out 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 ages 18 and older were found to have Internet, a small but significant rise from the 66% in April of 2012. Demographic factors again correlate with home broadband adoption associated most significantly with educational attainment, age, and household income. What is interesting is that while the overall "jump" that seems to parallel the HITECH Act of 2009 implementation is not as evident, the steady increase seems to resume.

In this report as with many of the subsequent ones cited from 2013 on, the focus now is on the smartphone as the new mobile access for broadband; and because of this access the statistical analyses must take into account the overlap between the two modes of transmission. Zickuhr and Smith (2013) discuss how the smartphone exists now as the alternate form of "home" Internet access with 56% of American adults owning one compared with the 70% who have home broadband. These figures, however, overlap to some extent since some of those who own a smartphone do not have home broadband (32%), which means that roughly 80% of Americans therefore have *some* form of access to the Internet whether it is home broadband, smartphone, or both. More specifically, 46% of Americans have both broadband connection and a smartphone; 24% have home broadband connection, but not a smartphone; and 10% have a smartphone, but not a home broadband connection. This means an even higher percentage of people have the means to communicate online with their physicians, not only from the privacy of their own homes but from anywhere their phones can access the Internet. Now more than ever this allows 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) caution that this 80% of overall accessibility may suggest a gap narrowing or widening for some demographic groups, but in many cases statistically this ends up a moot point. They explain 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 actually exacerbates 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 seems to narrow or disappear from a racial standpoint; but the gap seems to remain the same or worsen between various age groups. Considering these variables is 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 is that access between various demographic groups for the most part are improving but are still lacking to some extent when compared to the overall public usage rates.

Interestingly, in a recent Engineering Rysavy Research report (2011), the projection of smartphone data consumption usage levels are calculated to increase from about 0.3 GB[132] per month to almost ten times this amount per month from 2010 to 2016. If these projections are accurate—and the subsequent Pew reports suggest they are—then a tremendous surge will likely exist in the overall smartphone/Internet market, paralleling the physician/patient online electronic messaging and secured portal usage. When these factors all come together, it is

[132] "GB" stands for gigabyte which is a unit of computer memory or data storage which equals 1,000 megabytes. The amount of use over time indicates not only the number of users but the amount of usage as it increases from year to year. These projections, though significant may be modest if in fact the medium of smartphone and related Internet usage mimics that of electricity.

apparent that the medicological environment will continue to experience great technological adoption and growth now and in the years to come.

3.3.3.3.3 The Internet/Web Factor

It certainly appears that this dissemination of new media holds a direct correlation in general with the overall broadband and smartphone usage patterns and in particular with the HITECH Act involving physician/patient online interactions. Therefore it is reasonable to pause in noting the considerable recent attention brought forth by the Pew Research Internet Project in light of the Internet itself. In all, eight reports are slated to be released on the topics of privacy, cybersecurity, the “Internet of things,” and net neutrality with many of the most relevant to this dissertation presented early in the year (Fox & Rainie, 2014). The exploration will factor in economic change driven by faster and less expensive digital tools. There will also be ongoing information on how the American public responds to and perceives these mediums of change. It is suspected in general that the huge leap in usage will not occur until online medical communication also peaks, though, in a medicological environment, all factors that play on the general population inevitably play on the medical arena as well—directly or indirectly.

Interesting about the timing of these reports is that the implementation of Stage Two Meaningful use was officially delayed publically through the Federal Register dated September 4, 2012 through the Department of Health and Human Services 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 provide 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.[133] Therefore this time 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 lies in the fact that on March 12, 2014 the World Wide Web turned 25 years old. Pew chose to "celebrate" the history of Sir Tim Berners-Lee's launching of an early data-transfer system for specialists to a now mass-adopted technology for the world. By celebrating the Web, Pew takes this opportunity to celebrate the Internet itself and the many associated uses for it. Of course, as Pew aptly points 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.[134] Nevertheless, noting the prevalence of these public research reports is important because the medicological environment which inevitably responds to this research is affected especially now by the added attention this celebration affords. Fox and Rainie's perspective is certainly a positive one, stating that the "overall verdict" of the Web's public influence in the U.S. today is

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[133] See Chapter 2 for full discussion on the Meaningful Use requirements and government regulations.

[134] Fox and Rainie (2014) further state, "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 helps explain the interaction between these various means for communicating through the "architecture" of the Internet.

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 has become “the main activity for hundreds of millions of people around the globe.”

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

These results are startling when considering how brief the period of time 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 appear to reflect an almost universal acceptance. Indeed Pew paints a very rosy picture in this report, focusing in on the positive; but it must be cautioned that Pew does not speak in detail about the ongoing disparities still evident in various demographic subgroups as stated earlier—at least not in this report. The purpose of this report appears to be a celebration of the World Wide Web and growing Internet use and not the discouraging remaining discrepancies between the richer upper-class majorities versus the poorer lower-class minorities.

Nevertheless, this report reveals some significant findings. Through a series of interviews of Internet users, their expressed perceptions and feelings concerning this medium’s impact are measured. The results (as would be expected) are positive. When asked whether or not the Internet has been a “good thing or bad thing” for them personally, about 90% of all users say it is good with only 6% saying it was bad and 3% saying it was "some of both." In light of society in general they are a little less positive with 76% users saying the Internet is a good thing for society, 15% say it is bad, and 8% say it is 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 cellphone (44%), television (35%), email (34%), landline phone (17%) and social media (10%). When these numbers are compared to earlier reports and examined only from the *active* users' perspective, the statistics become 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 cellphone owners say 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 media usage. Overall, Internet and cellphone usage is considered almost equally hard to give up, perhaps indicating an overlap in how these two mediums are used; i.e., "smart" cellphones provide mobile Internet. However, when the comparison is made between the *active* users between 2006 and 2014, it is 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 cellphones (7 percentage point difference). This could suggest that what people do not want to lose out on in cellphone usage is their Internet access; though this remains questionable since the distinction between *types* of cellphones was not made in this particular study (smartphones versus regular cellphones) nor does it distinguish between how people use their cellphones (to text message, FaceTime, Internet searches, games, etc.).

Even more interesting is the fact that email is not as favored as the Internet overall. This again suggests that the various forms of communication and information seeking on the Internet far outweigh the desire to communicate through emails online. At the same time, the television and the email are roughly the same in general favorability to the overall public. To think that an email would be equal in measure to a television in the 1950's (or even the 1980's for that matter) would be unheard of. This is evidence yet again of the changing patterns of technology. Additionally it indicates the overlapping of technology since television programming can be obtained online through the Internet (on Netflix for example). This means that even if a person can do without the traditional high definition television, he or she cannot necessarily do without the potential for access to the programming online.

Therefore, as Pew examines the favorability of the Internet in comparison with other forms of technology, it must be kept in mind that many factors affect the interpretation of this data especially specifics on demographic differences. That perhaps is why many more reports will follow. One such 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 report going online (6% up from the previous year), 47% say they have high-speed broadband, and 77% have a cellphone (up from 69% in April 2012 study above noted).

Despite these phenomenal gains, the seniors still trail behind their younger counterparts in technological adoption (77% older adults using cell phones versus 91% all adults and 59% older adults using Internet versus 86% of all adults). Besides this lag, however, it is important to remember that the population of seniors who do not adopt any new technologies is significant (41% do not use the Internet, 53% do not have broadband at home, and 23% do not have cellphones). These discrepancies are quite substantial especially when considering that seniors represent the largest number of patients in the population. However, when the demographics are further broken down into the higher-income, more highly educated seniors, the Internet usage and broadband adoption approach and at times exceed the general population. Specifically, of the seniors with an annual household income of $75,000 or more 90% go online and 82% have broadband. This is 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 go online, 76% are broadband adopters while of those not having a degree, only 40% go online and 27% have home broadband. These differences are significant to consider when physicians are treating various demographic regions affected with a combination of age-, income-, and education-related factors.[135]

As Smith (2014) concludes, there are also many factors as to why older adults do not use cellphones and the Internet in general even beyond education and income including physical impairments such as vision issues, handicaps, chronic diseases, and the like. Many have skeptical attitudes towards the new technologies in general, learning difficulties, or general misperceptions about them.[136] One thing for certain, however, is that compared to their younger

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[135] 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.

[136] This entire notion of perceptions affecting how people use 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 current fears of the cellphone/smartphone for instance. People question whether or not it will alter the brain due to the electronic wave transmissions. People worry the laptop will cause uterine, testicular, or prostate cancer. Of course, there could be

counterparts, older adults are nearly as likely to continue to use the technology once they do learn how to use it. Specifically, 94% of those ages 18-24 use the Internet overall with 88% using it every day and with 6% of that group only using it a few times a week as compared to 82% of those in the 65+ age group who use the Internet overall with 71% using it every day and 11% using it a few times a week. This indicates that seniors still lag behind but they do have a strong commitment towards their technology once they learn to use it, just as do the younger adults.

Eligible, able adults, therefore, can and will very likely use technology within healthcare if time is spent training them and providing the service to them or their patient advocates. As will be discussed in later chapters, this may in fact become part of the role of the physician as educator, a person who helps patients learn to communicate and access information online through the EHRs and secured patient portals. Change indeed is revealed 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. Change is coming in the area of healthcare in particular.

3.3.3.3.4 The "Electric" Factor

The March 11, 2014 Pew Internet Project Report called "Digital Life in 2025" leads 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

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some truth to this if in fact such "waves' could interfere with cell formation and growth. However, the fear itself is what makes this whole new technology reminiscent of electricity and the Carolyn Marvin notion of electrical textuality now being substituted with Internet Textuality. At best, perhaps the relationship is at least similar in how far-reaching and consequential the introduction of the Internet is on this ever transforming society. The Medicological Environment indeed is affecting and affected by this medium through the mandatory governmental regulations requiring EHRs and secured portals for electronic medical interactions online, i.e., emails.

lead yet again calls 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 is so intertwined with the lives of the general public that it sweeps aside the importance of particular mediums like smartphones and EHRs for that matter and replaces it with an entire environmental transformation. The "electricity" of the Internet and all its components is becoming such an inherent aspect of life that it loses its identity as a separate medium and becomes a part of the context of life that for the most part is not even noticed. The Internet has become an accepted reality, an expected reality. It is the new normal. Just like turning on a light switch in the dark, the only time one really notices it exists is when it does not work, when the dark is not automatically replaced with light, when the computer screen crashes, or when access to ones best friend (or physician for that matter) is not instantaneously accessed with the stroke of a key. Life in most developed regions, perhaps, really is so dependent on the Internet's architecture that it is something that simply exists, something that is expected or taken for granted and only noticed if something goes wrong. Like the sun shining on a computer screen of emails about health issues, the health issues become the focus while the sunlight that produces the electricity, the electricity that enables the computer, and the Internet that directs the email are 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 is the focus of Pew's new projects, the 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 & American Life Project and Elon University's Imaging the Internet Center gathered 2,551 responses from 1,867 individuals from around the world.[137] 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 20th century (most notably impacting finance, entertainment, publishers of all sorts, and education).
- Tagging, databasing, and intelligent analytical mapping of the physical and social realms. (p. 23)

These themes may more generally be categorized as a global networked environment, an augmented reality, an evolution of artificial intelligence, disruption of business models, and analytical mapping.[138]

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 mediums that

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[137] 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)

[138] The long list is included for accuracy, straight from the Pew report. The shortened one is my personal synopsis which does not necessarily represent the intention of the report nor the categories' depth and detail in general.

transform an earlier world that was separated by oceans and continents to one shared by all through merely turning on the television or radio. Some argue 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 are, what these themes say of the near future are astounding. The Internet with all its interrelated layers of mediums (smartphones, emails, texting, Face Book, Snapchat, etc.) networks people, businesses, governments, cultures, and virtually all systems while providing huge data bases for analytical analysis left in the trail of these interactions (as no email or computerized transmission of any sort is really ever erased or "trashed"). Delivery of messages is fluid and simultaneous; yet those messages are trapped, contained, stored, and retrieved forever recorded in time and space. This of course calls to mind the very same fluidity and spontaneity of the electronic medical message exchanged through secured portals. These messages are forever recorded for future reference and analyzed not only by the physician in charge but by the government body or independent researcher who obtains access to this data (emails, texts, Facebook exchanges, etc.) for business, professional, educational, or even personal (and perhaps less admirable) purposes.[139]

The Pew report also listed "less-hopeful themes." These indicated fears of divides emerging between those who know technology and those who do not, resulting in violence, government and corporate power struggles, security and privacy issues, and inadequate responses to complex networking challenges. This list likewise reflects upon general technology concerns as well as calls to mind the very concerns already evident in the minds of those who use

[139] I for example have obtained access to patient email exchanges within the HealthTrak secured portals as permitted by the University of Pittsburgh IRB system. The data had to be de-identified; but it was still data available to me for analysis.

electronic messaging. Security is always an issue, especially now when data breaches mean that patient information (typically including social security numbers) is being stolen at an alarming rate across the country due to the less-than-secure firewalls protecting the data itself. Laptops with patient data have been stolen. Data bases have been lifted. Unlike the transition into ATM machines and online banking, there seems 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.

Indeed the issue is a frightening one when information falls into less than reputable hands. For instance, according to the 2013 Breach Report: Protected Health Information (PHI) executive summary, a total of 904 large breaches of PHI have affected over 29 million patient records as reported to the Secretary of Health and Human Services (HHS) since the HITECH Act of 2009 went into effect (Redspin, 2014).[140] 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 is 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) states, "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 is "big business" in the black market, and such a business challenges the very privacy and security of the public. In short, the fears articulated in the Pew report (Anderson & Rainie, 2014) are

[140] 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 of 2013. This left plenty of time for hackers, computer lifters, and nosey 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 can lift such information frighteningly easily, especially prior to 2013.

certainly valid ones not only in general across all areas of life but in the healthcare arena in particular. If online secured portals within EHR systems are to be mandated, the essence of HIPAA and patient privacy must be addressed just as the respondents of this Pew report state needs to be done in other areas of public life.

Both the negative and positive implications of these themes call to mind the inevitable excitement and fear of the unknown, of something that transforms "life as we know it" into a world of possibilities and pitfalls. Some look forward with anticipation, others with trepidation.

The final theme which looked towards 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 is in how this future is invented, who does the inventing, and who controls this process.

The Pew report (Anderson & Rainie, 2014) ends 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 warrant attention: (1) Healthcare is barely mentioned throughout the entire report; (2) No health-related professional was included as 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,[141] and (4) the notion of "future" can only be framed in past and present experience (observations), meaning that predictions are educated guesses and no one should ignore the

[141] A particular quote from John Savage a research scientist from Brown University spoke directly about McLuhan in saying, "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."

possibility of the unknown emerging as something totally unpredictable.[142] At times what is omitted speaks as loudly as what is included. These conclusions speak mainly, of course, from the perspective of the medicological environment, a space likely not considered in this report.

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 mediums 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 very unique, ubiquitous space that is intimately, permanently, and

[142] Patrick Tucker, editor at large for The Futurist magazine wrote, *The Naked Future: What Happens in a World that Anticipates Your Every Move?* (2014) in which he talks 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 I believe there are always odds against the inevitable, and so perfect confidence in predicting anything from hurricanes to flat tires can always be wrong. At best, all we have are probabilities—better and better ones with more and more accurate and robust data—but probabilities nonetheless.

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 how one functions within this environment.

3.3.4 Physician/Patient Current Response Patterns

With all the media hype surrounding the election of a new president and the many unfolding government program names like “Obamacare,” the Affordable Care Act, the “Stimulus Package,” and the HITECH Act being tossed around, one might assume that physician/patient online communication would be commonplace at the present time. In effect, however, the medicological environment continues to adapt to change as home and broadband access increases while demographic population differences decrease for the patients. At the same time, meeting the requirements for the Stages of Meaningful Use remains a challenge for many physician and hospital-based practices. The reality is that there is 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 have for the general public. Somehow the EHR/secured portal medium is different. It harbors deep fears of privacy and security, threatens insurmountable costs and transition burdens to physician practices, and perhaps challenges the very relationship formed by face-to-face office visits so common in medicine today. No, for emails to become commonplace in medicine, more time, testing, and preparation needs to come about before both the physician and the patient can respond to this medium with fully outstretched arms. Certainly there is an awareness of this process, but the awareness needs to translate into usage if the projected benefits of online communication between physicians and patients can be realized.

3.3.4.1 Patient Current Response Patterns

As electronic messaging takes root and develops within the field of medicine, both physicians and patients react not only to the medium itself but to each other's response to that medium. Patients typically learn about the option for online messaging when the physicians' offices tell them about it. Physicians learn how much patients like or do not like the online factor based upon their rate of usage[143] and expressed enthusiasm for the medium. It is unlikely that most patients and physicians get their information from published statistics on how each other feels about the medium. They more likely talk to each other about the medium when it enters the environment of the office visit and takes on its increasingly more prominent role in the care of that patient. [144] Again, adoption depends upon an ongoing sharing of information, problems, interests, fears, and overall knowledge about how this new means of communication can effectively translate into a medium that works to facilitate physician/patient relationships and overall patient care. The medicological environment shifts and responds (a sort of ebb and flow

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[143] Usage rates are calculated and recorded automatically within the EHR system in order that the data may be transmitted to health insurance companies and government offices. This data is used to help determine whether or not the amount and type of use merits the designation of "Meaningful Use." Likewise, many insurance companies base their rate of reimbursement per patient on factors associated with the extent of such usage. Right now there are many different levels and types of usage criteria that must be present in order to determine how much reimbursement per patient will be awarded from an insurance and even government perspective (Medicaid for instance). Although the focus of this paper is on electronic messaging, it must be kept in mind that many other coding criteria associated with patient care are of primary concern in determining overall reimbursement rates.

[144] 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 discusses this online relationship with patients. In turn, since his practice is in a rural community, his comments about the medium are shared with me not only by him but by the patients themselves who talk about what he says and about how they feel. *The medium as it develops becomes a social entity, a topic of discussion.*

of untested waters) to this as it continues to reach towards a state of equilibrium wherein both sets of users can incorporate this new technology into commonly accepted, day-to-day usage.

In time the environment gradually shifts its focus from the obvious physical presence of the computer to the various functionalities of the EHR itself. Research in this field reveals such a changing perspective as well. For instance, earlier on, research focused more on the physical presence of the computer during the medical visit in light of how the object itself interfered with the eye contact of the physician and the overall medical interview (Hsu, et al., 2005). Now the focus needs to be on how patients are responding to the new *functionalities* of the computer including the secured portals which enable access to lab reports, prescription refills, billing information, health updates, and of course, electronic communication with the physicians themselves. This is an area of research that is lacking right now perhaps because the interest is not there, but maybe more because EHRs are not yet fully implemented through all Stages of Meaningful Use. The system is still working towards accepting computers in physicians' offices and in hospitals as common place.[145] Whatever the case, future research must keep in mind that one-way communication (e.g., physicians placing patient record information in EHRs or sending out automated educational messages to patients through portals) is not an interaction. Both

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[145] 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 used the Internet and accepted online communication with their hospital and patients as a norm. Although these statistics seemed rather surprising to me at the time, during a subsequent presentation and discussion with electronic communication experts in that region, I was told that the Netherlands is a relatively small country, and the means for developing such expansive communication is vital to their system. Another 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 towards an equilibrium that acknowledges online communication within the healthcare profession as "normal," useful, and perhaps even commonplace.

members of the relationship have to want to use this form of communication if it is to work and be effective.

It must be emphasized that an electronic message implies shared communication between two people, a relationship-generating, interactive unit between two parties of equal participatory value.[146] 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 feel like an invasion of privacy just as calling physicians directly on their private lines or personal cellphones in the middle of the night would be. Special permission must be given to gain such a right, and that permission has been granted by (and required through) the Stages of Meaningful Use. Physicians who choose to purchase and implement EHR systems, make the choice to add this means of communicating as part of their relationship with their patients.[147]

This relationship, however, is new to patients and physicians alike. It takes an adjustment period to learn how to adapt not only to the use of the medium but the fact that patients and physicians share almost equal space and an equal right of access to each other all

[146] This of course is an ideal list. The concept of "equality" is often rightfully challenged when looking at the physician/patient relationship due to socio-economic factors, education, and information security—to name a few. However, when an email is transmitted from one person to the other, there seems to be greater equality (1) because the patient has the right to contact the physician at any time and from anyplace that has Internet and (2) because the patient can write as much or as little as desired. Point two, however, is not always the case. At times, some portals (such as the one studied in Chapter 5 in the HealthTrak study), control how many words the patient can use in a response but they do not control the number of words the physician uses. This shows a definite inequality. Therefore, the relationship on the surface appears to be more equal due to medium availability and physician/patient access, but the medium itself, which is managed by the physician can 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 responds.

[147] 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.

day, every day through email. Office phones guard the physicians with answering machines, answering services, and secretaries. The same exists for emails with inboxes, auto responses ("Please do not leave emergency messages on this service."), and portal "keepers" (media secretaries and health professionals used for directing emails). However, there is 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 they technically may not receive the message until the next day).[148] Furthermore, it must be noted that once the secured electronic message is "linked" to a physician through his or her response within the system, the emails (in most EHRs) tend to be received directly and not intercepted by the medical secretary at that point. The physician can thus choose to continue with a direct interaction with the patient as opposed to one that is first screened by a medical associate. If a physician also has the email "pushed" to be received immediately with perhaps a ring tone set as a warning as to when a message is coming through, that noise in the middle of the night could in fact be an intrusion of space and time. However, the physician has control of such "settings" perhaps more than on the landline phone since the phone must be answered when the physician is working on call. Emails do not have to be answered any sooner than 24 to 48 hours depending upon the protocol of the EHR system. As emails become as commonplace as phone calls, the usage rules may change and this in and of itself would be an interesting area of observation and research data collection.

Studying how these relationships change as the medium is adopted and becomes more and more a part of physician/patient interactions is a vital part of understanding the effects this

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[148] I have found that my dentist responds to emails even in the middle of the night. I was alarmed when I sent him a message at about 3:00 am 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 in light of access and delivery.

medium might have on the physician/patient relationship itself. This makes it difficult to single out patient versus physician research as if each stands as an independent entity. Both the physician and the patient views correlate with and sometimes complement each other. Both are important together even though most current research separates these two groups by only interviewing the physician or only interviewing the patient instead of interviewing them individually about their perceptions of the *same* relationship. That is, physician/patient dyads need to be studied as they develop online and should be compared and contrasted with face-to-face relationship development as well.

Currently there is relatively little written about the patient response to electronic messaging between physicians and patients, possibly because enough data is not available on this topic at this point in time but more likely because the focus itself has largely been on physician adoption efforts and associated problems. Today, many physicians are still trying to take their first steps towards reaching the Stages of Meaningful Use, while many have given up and/or retired. Granted many hospital systems and urban practices have already begun this process, causing the number of overall users to grow, but the attention in the most recent literature and research for now is mostly on the physician and not on the patient. Patient-centered care might be a popular "catch phrase" in the communication relationship literature, but patient-centered electronic messaging has barely been studied at all.

Some research does exist on this topic but most of it has focused on the pre- rather than post-HITECH Act period (pre-2009). One especially well-done, longitudinal study might serve as an example for future research focus (Hsu, et al., 2005). In this study, *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 pre-computer period to determine a baseline, again 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 get used to the presence of the computer, the more likely they are to be satisfied. (This also could mean that the longer a physician uses the computer the better at using it and communicating with it he or she becomes.) 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 exist due to the mere presence of the medium itself as being something "new" and intended to improve patient outcomes.[149] Simply put, the mere presence of the new medium itself may have caused these differences more than the practical functionality of the medium. Patients might also be impressed by the fact that the physicians' office is technologically up-to-date. Any of these reasons could be why the positive patient response to the EHRs and computers in the medical visit was achieved.

More such studies should be conducted during and well after the transition from paper to electronic charts. Likewise, studies should be done on the secured patient portals themselves and the pre- versus post-perceptions of the physician/patient relationship as it develops over time without the electronic messaging component and then later with the component added in. Satisfaction levels could be compared on just this function of the EHR rather than on the physical presence of the computer itself. In short, this study on primary care physicians who

[149] 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 be the reason for the positive response and not the medium of the computer itself.

were early-adopters of computers in their practices should be repeated in multiple locations over a longer data collection period involving physicians who exhibit 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 has come out from the Center for Studying Health System Change 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% in2010). 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 out. Whatever the case, this research is one of the few related articles that came out from the patient perspective at this period in time.

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

3.3.4.2 Physician Current Response Patterns

Research on physician responses within the changing medicological environment, however, is much more prevalent than patient-related research. Patients cannot adopt the medium until their physicians offer the means for contacting them—unless of course they change to a different physician who is willing to make the transition. For the most part, current research focusses 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 is the system within which all other functionalities exist. 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 that explores today's management of electronic messaging between physicians and patients.

3.3.4.2.1 EHRs, Meaningful Use, and the Affordable Care Act

Numerous studies have explored the effects of EHRs on the medical interview from the perspective of the physician and have suggested that the healthcare arena has been slow in adjusting to this change largely because it has 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 argue (Guttmacher & Tiersten, 2014), the relationship between the clinician and patient is markedly challenged due to the constant need for data input into the EHR/computer during the office visit. This process severely limits 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" (likely the check box entries described earlier and common to most EHR programs) 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 can be 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 of 2013, more than 80% of the physicians interviewed stated they were struggling with spending sufficient time with patients due to dealing with impacts of the Affordable Care Act 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 Affordable Care Act. In fact 21% stated that there was a "somewhat negative impact" while 11% stated 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 there was "little progress" and 27% felt there was no progress at all. The impact of these changes, in short, seem to be perceived as not improving patient relationships but harming them instead.

It is safe to say that most physicians greatly care about their relationships with their patients. They do not want data entry during the office or emergency room visit to hinder the overall care of and relationship with their patients. Many argue that computer screens physically *interfere* 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 can obstruct the interaction and become more of a hindrance than a benefit. Many simply are comfortable with how they have always interviewed patients and do 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.[150]

Even with the use of medical scribes, who are professionals who assist the physician by inputting data during the medical visit, there still is 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).[151] Although the incorporation

[150] As stated, EHRs contain within their programs menus or lists. These menus act as a check system for making sure that the physician and/or nurse has covered all the necessary factors having to do with treating the patient for each illness or problem presented at the particular office visit. The effective use of these check boxes actually is assessed by insurance companies who review the physician notes to see what is being covered and to determine whether or not enough has been examined on the patient to warrant a specific charge level. If the physician puts down more diagnoses, for instance, the patient can be charged a higher rate per visit since the physician technically covered more things. These check boxes can complicate the visit, especially of primary care physicians who have wide variability between types of patient problems that present each day. The more problem types that are listed, the more check lists need to be included, which means the more time that the physician has to spend with the patient (and the more he or she can charge). Although some feel these lists are helpful, others feel they inhibit the natural flow of the medical interview, restrict the physician line of questioning, include unnecessary categories and exhaustive lists, take up considerable time, distract the physician from the patient's nonverbal responses, and even decrease the care of the patient.

[151] I have had person 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. As this is my personal opinion, there needs to be further research on the growing number of scribes being employed within physician practices and the level of care and personal attention that is

of scribes has been accepted overall in the medical community (Lewis, 2013), challenges remain in that physicians, patients, and scribes must adjust to this altered communication environment. Physicians see scribes as a viable option to their struggle to keep up with data input demands, lack of patient eye-contact, and increased pressure to see more patients in shorter time allotments (especially in practices employed by independent, for-profit institutions who often place pressure on the practitioner to see X number of patients per time slot in order to meet rising costs and patient demand). It is a vicious cycle as the need for data entry in electronic records has led to a greater need for help during the office visit while few qualified, trained scribes even exist to meet this demand. Most scribe training programs across the country are not standardized, and few if any have been endorsed by the American Medical Society.[152] In fact many scribes are not formally trained as such but rather are medical students, nurses, medical secretaries, and assistants who know medical terminology are 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 may have liked technology and saw it as a benefit to their practices. These, however, have been the exception rather than the rule.[153]

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possibly sacrificed as a result of this method of data input. Granted it frees the physician from physically documenting into the computer but it also distracts from the private physician/patient relationship as well.

[152] 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.

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

This struggle to adjust to this ongoing challenge within the medicological environment has created an unstable, uneasy state of flux for those who wish to continue practicing medicine. As with any change, an adjustment period takes place to respond to the equilibrium brought on by these changes. The question is, do people want to make this adjustment within the system or do they simply want to leave the system altogether? Surprisingly, many physicians, particularly those who are approaching retirement age, have opted to stop practicing medicine rather than have to meet the governmental mandates. They entered medicine with an anticipated set of rules and behaviors; and now those expectations have been 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 may themselves be aging and basically content with the way things "have always been"; all have influenced the willingness of some physicians to adopt the EHRs and the associated forms of on online communication.

Evidence of this resistance may be found anecdotally (as in the Chapter 4 interviews with rural physicians), but it is 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 say they plan to leave their practice within the next two years including 15% who are "very likely" to do so. Among all physicians surveyed, the main reasons for leaving is that it is "hard to make practice profitable" (29% of those surveyed) and it is time to retire (25% of those surveyed). This means that out of the 300 practicing physicians surveyed in the field of primary care, over half are leaning towards retiring or quitting their office practice. This is a startling statement when referring to the key, most needed physician specialty in the country right now and the primary one necessary to enable implementation of the Affordable Care Act.

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 30 million Americans are expected to acquire health insurance as a result of the Affordable Care Act (ACA) with an estimated 190 million hours of paperwork imposed annually on the healthcare system and related businesses per year. The fear is how this system will 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.

Indeed the medicological environment has been severely challenged by this situation. In Anderson’s state-by-state report on the numbers of available primary care physicians, nurse practitioners, and physicians’ assistants, the anticipated demand for personnel across all state lines reveals a frighteningly dire need for more primary care practitioners and support personnel. When coupling this with the apparent decline of physicians desiring to continue practicing medicine in the United States, the problem appears almost insurmountable. The question is, can the medicological environment respond to the increasing need for patient care when so many more patients have entered the system as a result of the Affordable Care Act and when so many primary physicians plan to leave their practices? Can the system return to a state of equilibrium of standard patient care when such additional demands are placed on it from outside political, economic, and social forces? The situation may likely result in a very bleak future for medicine unless the medicological environment somehow readjusts in an effort to accommodate such a decline of cooperating and/or participating physicians. Either outside forces (such as fewer, less aggressive government requirements of implementation) must alter the nature of their push towards this massive change or inside forces (such as physician methods for seeing patients, i.e., less time spent, more non-physician services, etc.) must adapt. The medicological environment is characterized by a hugely complex set of conflicting forces that must adjust if an equilibrium (a fully functional healthcare system for patient treatment) is 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 notes the dwindling number of continuing participants in the Meaningful Use program, indicating a 20% drop from those that already have adopted EHRs.[154] What is so frightening about this statement, is the implication that despite all the incentive initiatives, the public promotion of the HITECH Act, the burst of vendors of EHRs, the efforts of

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[154] Stack's statement also outlines how the Meaningful Use program under the Centers for Medicare and Medicaid Services (CMS) could improve upon its demands by replacing their "all-or-nothing approach" with a 75% pass rate for achieving Meaningful Use. He also advocates physicians who meet at least 50 percent 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

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 remains in flux. There is the thought that no matter how much the physician population was forced into this transformation, it just might need 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 are 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 is great in theory but stressful, demanding, costly, and just plain difficult in real life circumstances.

In response, the AMA, through Stack's statement, is, however, arguing that EHRs are here to stay and most physicians are 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 is necessary. This request has been heeded to some extent at other levels as there have been multiple delays setting back secured portal implementations (part of Stage Two Meaningful Use), the ICD 10 conversion process,[155] and EHR requirements for underserved areas. The point is, the Medicological Environment is bubbling with activity, but in order to encourage and not

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[155] 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 now it is 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 the EHRs, a delay was put into effect until October 1, 2015. The ICD-10 system is markedly more complex. When combined with the existing EHR computing systems, it will provide the means for gathering data on disease, usage, procedures, hospitalizations, treatments and the like. Once EHR systems become interoperable the wealth of Big Data for research and tracking purposes will be great. Of course some physicians feel this may lead to legal and privacy-based issues placing their practices at risk, the argument is that the "greater good" of such vast data banks will open the door to previously unattainable data for research in disease prevention and the like.

deter adoption, change might need, figuratively speaking, to bubble at a “simmer” rather than a “boil.”

In order to place the significance of this decrease into perspective, it is necessary to review the most recent adoption rates from the National Center for Health Statistics (NCHS) and Center for Disease Control (CDC). In a report dated January 2014 (Hsiao & Hing, January 2014), adoption of basic EHR systems by office-based physicians have 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 reveals 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 use any type of EHR system which is up from 18% in 2001 while only 48% report 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 suggests the influence of the HITECH Act of 2009 and the continued incentive push for Meaningful Use in the years to follow. If physicians are really dropping out of the program as Stack argues, the rise in adoption still shows significant signs of surging upward based upon these most recent statistics from the CDC.

Perhaps the reason for Stack’s concern has less to do with these positive number trends and more to do with what physicians are anecdotally saying about their satisfaction and comfort levels when attempting to meet EHR adoptions and Meaningful Use incentives. In a recent RAND research study, surveys and semi-structured interviews were conducted on 30 physician practices in 6 states concerning satisfaction levels (Friedberg, et al., 2014). The results of this study reveal that physicians who have adopted the EHRs and subsequent online communication requirements are 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 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 affect the medicological environment: financial stress on the practice, lack of quality time during patient interactions, and impending loss of decision-making control over who becomes a physician (changing medical school admission standards), how many enter into each subspecialty (residency program restrictions and demands for primary care physicians), what is 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 prepare students for medical school (with humanities-based majors competing with science based ones) and which professions are valued (social vs hard science).[156] Perhaps the problem lies 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 can lead to an explosion or in this case an implosion within an environment already suffering from the relentless demands from simultaneous externally and internally bombarding forces. Simply put, physicians want to practice medicine, spend time with their patients, and utilize the professional skills they are trained to do. The medium—in this case the EHR—affects the structure and function of the physician/patient interaction and in turn challenges the stability and quality of patient care.

3.3.4.2.2 The Relationship between EHRs, Secured Portals, and Electronic Medical Messaging

Indeed it may be noticed that considerable focus has been devoted to the EHR when the topic of this paper is supposed to be on physician/patient electronic messaging. The reason is that one cannot appreciate the impact and relevance of secured portals (which help manage, distribute, and protect patient records) and electronic medical messaging between patients and health professionals (namely physicians) within these portals without first understanding the

[156] As the ACGME (Accreditation for Continuing Graduate Medical Education) has included Communication as one of the core competencies for medical professionals, the tide is changing as the humanities have been included more and more within the study of medicine both during and after medical school. Nevertheless, there still remains some unspoken prejudice (or at least division) among those who study 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 members of the various professions. In a sense the internal dynamics of the medicological system are affected by the perceptions and responses from within as well as outside of this space.

significance of EHR implementation within the overall medicological environment. Without EHRs affording widespread online interaction capabilities, electronic messaging might be at best an option but certainly not a mandate. Although EHRs were not developed solely for online patient interaction, they have provided the means for this form of communication. They are the medium through which online communication takes place. As a mandate, secured portals and required message exchange impose 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 are being forced to comply with this form of communication. The government has not made it an option. Online physician/patient communication is here to stay and will grow as physicians and patients continue to adjust to the change this has and will continue to make within the medical relationship.

A simple comparison with the telephone's introduction into physician practices might help show the magnitude and novelty of how this particular "new" form of medical communication has 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 no longer was 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. As already discussed 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 respond and gradually adjust to the changes.

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 smart phones, and fewer people were left out due to demographic differences. The Internet and email gradually became a part of everyone's world—except for the world of medicine. 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 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, is 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.[157] That is, physicians themselves could choose when to get a phone and how frequently they wanted to answer it.

[157] Even the EHR vendors did not develop computer programs that met all of the standards that the government set out. Most had to invent the programs as quickly as the regulations were being past. Many hospital systems purchased early EHRs and then had to repurchase more effective ones later. (The UPMC Health System is one example of this as discussed in Chapter 5.) Another example is the idea of interoperability, which is not yet a reality but which was proposed forthrightly well before the EHRs were even ready for distribution. The "horse came before the cart" in this case. The laws and regulations were established even before the technological means for following these laws were met. This is still the case in many instances as companies. 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 end 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 are being imposed by outside forces (government laws) rather than by the system players within the medicological environment. Change is more rapid in this case, but it is not as well accepted and not as effective as it could be with a more gradual process of implementation coming from within rather than outside of the system.

Regulations were not 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, as if they were anticipating what some thought might become a standard of medical communication well into the future. 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 not bound by law but were mere suggestions for practice.

What makes secured portals and electronic messages so transformative and different is that now an abrupt change has been imposed by the government to *force* adoption of secured portals and online communication as a basic requirement. Associated rules and regulations are now more formally outlined and developed into law (not just suggestions) by HIPAA, the Stimulus Act, and the Affordable Care Act. This time, the process of introducing the medium within the healthcare profession is not gradual and not an elective one. There are deadlines. There are financial penalties for lack of compliance. All of a sudden physicians are required to adopt—or else. The response in the physician world has been all but chaotic with many deciding to "bale" or quit practicing altogether in response to mandates they cannot or will not agree to meet. This is not a gradual, adaptive process. It is an abrupt, forced one.

Electronic messages and the telephone certainly have similar traits but this time, the way this transformation is occurring is much different. As a result, the medicological environment is impinged upon, injected with requirements from various outside forces in an effort to impose not only a change but a time-controlled change. Physicians and physician support systems like the AMA are fighting these changes (as noted in the earlier example). Political parties are objecting to various portions of "Obamacare" on the principle of it being dictated to the American people with or without their consent.[158] Indeed this transformation process is quite different from that which was experienced when the telephone was introduced. This time the adjustment to the new medium is an explicitly prescribed one which is determined by lawmakers, insurance companies, and the government itself.

The medicological environment at this particular point in time demonstrates how a previously dynamic yet stable system can 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 begin to direct action from the outside in, requiring change even before the system is ready and willing for change to occur. Outside forces are collectively altering the natural course of medium adoption within the typically slow-to-change healthcare arena. It is a point in time wherein healthcare is not standing alone as its own governing body (guided largely by the AMA and state-run bodies) and mainly adhering to the Hippocratic Oath and internal ethical standards of the scientific world. Rather it is driven by outside invading systems that impose untested rules and laws on a resistant healthcare arena. Certainly this is not to say that the American Medical Society and other internal governing bodies no longer are players within the system; but they are being acted upon and are spending *more time reacting to the change than defining the change* (as in the Stacks example above discussed).

[158] Political arguments from Conservative groups such as the "Tea Party" have attested that the Affordable Care Act (typically referred to by them as "Obamacare") is a direct violation of presidential power in that it forces citizens to comply with healthcare reform and will inevitably result in a full-blown Socialistic society. This is not what is being said herein. However, it is yet another example of how politics have affected the perceptions and decisions that directly alter the dynamics of the medicological environment. All views, accurate or not, have the potential to affect the stability if they are expressed by powerful enough people, reach a wide enough audience, and are heard by significant players within the healthcare system.

In effect the medicological environment exists as its own ecosystem functioning within its own fluid boundaries. It is driven by its own ethical standards and laws that have been tested and argued over a long period of time as a result of vast experience and repeated challenge. It is guided by basic human rights and moral obligations. Now, however, the reason physicians are so willing to give up the profession they love and the reason so many are questioning this process is because it is being directed from outside the ecosystem by practically every other system on earth: legal, political, social, religious, economic, and so on. Previously these systems always affected the medicological environment with ideas, influences, and outside resources. This happened because the medicological environment is not a closed system, it is easily affected by outside systems that permeate the environment simply because those who exist within the healthcare arena also exist in other systems such as economics, business, politics, and so forth. That is, physicians are business leaders, hospital administrators, political candidates, and stock holders. Physicians are patients too. There is and always has been overlap between the systems. Now, however, the protective borders of this environment have been challenged by the abrupt, forceful intrusion of government mandates.

Additionally it is important to note that the words “mandates” and “laws” and “force” sound quite strong and imposing. They are meant to because this transition has been all but gradual, and the healthcare profession has all but accepted all of these changes with open arms. Granted some have agreed to many or even most of the changes. The argument herein is not about whether or not this change should have come about or even whether or not it is justified. Rather the argument is that this change simply has occurred in a manner uncharacteristic of the more deliberate and systematic patterns of change in the medicological environment of the past. Yet like electricity, the switch has been “turned on” and there seems to be no shutting it off.

Many physicians and hospitals have invested a tremendous amount of time, money and energy into this transition as if they have accepted it as the way to the future, even if their level of acceptance did not come willingly at first. This is not to say that the government lawmakers do or do not have the right to make such rapid changes on a typically slow-to-change environment. This is to say simply that change has occurred, and this change needs to be studied as to its effects on the system and on healthcare itself. This impingement on the medicological environment has not been typical, but it has happened. As a result, there is no turning back. Physicians and hospitals have already spent billions of dollars on EHR systems including new space to store data, new equipment, and a great deal of training.[159] Change has been introduced into the environment, the equilibrium has been upset, and now the system must respond by readjusting and returning to some sort of state of equilibrium. A simple way of putting this would be to say that physicians and patients alike will eventually become accepting of the online communication with each other and will acknowledge it as a vital part of dealing with one's health. It will not be surprising or odd to talk to a physician online. Rather it will be as commonplace as making an appointment and meeting him or her face-to-face. This will be the future; but it will take some time before the entire system adjusts to reach this level of acceptance. The issue now is that the current reaction to such rapid and forceful change coupled with the ever changing and increasingly accessible technological advancements all need to be studied. Right or wrong, effectively or ineffectively, the environment has changed. Now is the time to research and analyze how all of these systems have shared in the process.

[159] The following link is 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 point out the financial and health-related issues actively playing on the medicological environment today. Dr. Jha is a practicing general internist at the VA and is a professor of Health Policy at the Harvard School of Public Health. I had the privilege of corresponding with Dr. Jha through mutual research associates through the University of Pittsburgh. His insights into the effect of the EHR transition on the financial, political, social, and medical fields have been widely viewed and esteemed. He is recognized as a key scholar and expert in the field.

Again, secured portals exist *within* the EHR system. They have become a required part of Stage Two Meaningful Use. Without EHRs, such a requirement for online communication may have been a long time in the making. The medium itself (the EHR in particular) drove the capability and usage of the online interactive system. By requiring EHRs and all of the associated functionalities of this medium, secured portals and electronic messaging within these portals were thrust into the forefront of patient care, something that may have eventually happened naturally, but something that did not have to happen so forcefully, abruptly, or disruptively. Prior to this medium for message recording and exchange, the physician/patient dyad either used unsecured mediums such as AOL, Yahoo, or Gmail to exchange messages; or, as discussed earlier, the physician proactively had to purchase secured venues for message transmission which at the time were unpopular, expensive, and relatively untested.

The point is that the drive towards electronic record implementation (EHRs) has forcibly impinged upon the medicological environment by introducing and popularizing this relatively new form of physician/patient interaction. The secured portals and resulting electronic medical messaging are a sort of byproduct of the EHR requirements. That is, without understanding the impact of the EHRs within the overall system, electronic messaging would not be as influential a factor at this particular time within the medicological environment.

That being said, those who have advanced through Stage Two of Meaningful Use and/or those who have independently chosen to implement this means of secured communication have come to realize the benefits and shortcomings of this medium. It is therefore vital that this entire process be studied from multiple perspectives in an effort to learn from this process and to assure that the healthy future of this ecosystem, this medicological environment may be assured.

3.4 THE MEDICOLOGICAL ENVIRONMENT AS A FIELD OF STUDY

There are many ways of assessing the effectiveness of these communication patterns, but thus far too few research studies have examined them from a multi-methodological approach. That is, little has 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 has been so heavily directed towards the effectiveness of the *EHR as a medium* and not on the *communication* within the secured portals of the EHR. Indeed a wealth of research has focused on this medium, and rightly so, since it is the single most significant technological change in medical communication since the telephone. It makes sense to focus initial research on physician and patient response to this medium in light of their economic challenges, broadband access, equality among various patient demographic groups, and overall physician willingness to adopt as thus far discussed. As indicated above, a wealth of anecdotal and qualitative survey responses have provided insight into the effect EHRs have had on the medicological environment. Likewise, many large research institutions have collected a wide variety of information on trends and responses from both the physician and patient communities. The EHR has been the focus because it is the starting point of this entire transition from paper to electronic charts and messaging. The electronic record affords (or at least hopes to afford in the near future) interoperability between systems; transmission of information across practices, states, and even countries; and broad data base analysis of trends anywhere from treatments to disease patterns across the world.

Despite the reason for this focus, the most fascinating aspect of this EHR capability from a communication relational standpoint is the electronic medical message transmission, which needs to be studied more systematically and multi-methodologically. Much talk has surrounded the secured portals, but relatively few physicians have adopted these let alone become proficient in their use, especially from the perspective of online communication directly involved in patient day-to-day care. This is not to say that no related research has been done but rather to argue that a great deal more research and rhetorical analysis of this part of the transition in patient care needs to be taken very seriously if it is to be understood, developed, and implemented within the medicological environment in a safe, effective, and transparent manner.

Therefore, it is the purpose of this discussion to shed light on where the electronic medical message fits into the medicological environment, how it specifically helps to shape future transitions in healthcare, why it is important to this process of transformation, and how it should be studied. In short, the environment needs to be explored as a phenomenological environment characterized by interconnectivity, interdependency, and systemic openness in mind. Thus far, the climate and factors of influence have been examined. The medicological environment has been identified as a dynamic space wherein converging influences from a wide variety of outside systems have acted upon this open system in a uniquely influential manner. Subsequent chapters will sample the environment to test what areas might be relevant to extended future research, what areas might require more in-depth analysis, and what current results have shown.

An appreciation for the complexity, diversity, and enormity of this medicological environment must be realized, but this can only be done from a broad perspective of viewpoints. The scope of this project is quite extensive. It attempts to capture just how interlocking this system is and to show that 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 the 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. This research 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.

4.0 THE RURAL ENVIRONMENT: TESTING THE LANDSCAPE

To appreciate the magnitude of impact Electronic Health Records and online communication of healthcare information places 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 discussion. 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 *all* of this 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 and thoroughness 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 begin 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.[160]

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 with early adopters taking the lead in academic settings such as the University of Pittsburgh Medical Centers (UPMC).[161] More accessible to the Internet, more research oriented (such as in the academic settings), 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 towards EHRs for many was already in process with the actual beginning point, less easy to define.

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[160] Some would even argue that they were blindfolded and pushed into this new world of Electronic Health Records. See interviews below.
[161] See Chapter 5 for full discussion

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 did not live in a totally different environment from the urban physicians. Rather, the influences and situations were different enough in both regions to warrant separate, focused study of each. To understand the medicological environment at this time of transition is to examine both groups as separate influences in the overall climate of acceptance (or rejection) of EHRs and online medical communication.

Despite the impetus towards change for both rural and urban environments, the reality of such a rapid transition evoked caution on many fronts. To begin with, the medical professionals associated with the Conemaugh Hospital System, 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; Gray P. , 2009). The greatest research focus up until this time, however, involved a wide variety of patient-centered concerns including physician media literacy (Safran C. , 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); accessibility, 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 multi-leveled 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, the existing government mandates at this time had predicted full implementation by the year 2014, something that as yet has only begun to come to pass. The most up-to-date research at that time (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. Finally, the Markle Foundation showed that only 6.1 million or about 2.7% of all U.S. adults have PHRs (Americans Overwhelmingly Believe Electronic Personal Health Records Could Improve Their Health, 2008).[162]

[162] See chapter 3 for updated information on current usage. It is important, however, to show what the research environment looked like at the time of this study as the medicological environment constantly adapts and changes based upon current research. Responses always reflect the given environment at any given point in time. Conclusions drawn are both reflective of and limited by the existing climate.

Such limited numbers of participants further beg the question as to how full implementation by all healthcare facilities and full interaction *between* systems[163] might have been effectively achieved by the governmental deadline date of 2014 (something now known as unachievable) 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 now mandate?

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. If in fact all members of the healthcare industry across the U.S. are eventually expected to convert to a fully electronic system, research on this process and this particular population is in order.

4.1 A PERSONAL PERSPECTIVE: JOHNSTOWN, PENNSYLVANIA

For many rural physicians, particularly in Johnstown, Pennsylvania, the thought of electronic health records was an unpleasant reminder of technological interventions and government

[163] At the time, PHRs or Personal Health Records were also considered. 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 is not currently the case with the addition of secured portals, i.e., 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 has been 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/.

influences of the past. The majority of rural offices had already converted (though 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 towards 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 (and continue today). 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. [164]

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 words, though seemingly cynical, reflected those 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

[164] 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.) Interestingly enough, 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).

practice during those difficult days of early computerization and new government mandates.[165] The influence of HMOs became a reality to us soon after we opened his solo practice in 1988.

4.1.1 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 reveals a key force of influence that set up the subsequent resistance of physicians against the upcoming mandated EHR adoption. People perceive the present in light of past lived experience. My husband's lived experience with HMOs was not unlike the majority 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 in an effort to band against the infiltration of HMOs in the Johnstown region. Physicians were asked to pay membership into the JPO and in turn gain voice and solidarity against the advancement of HMOs in the local area.

[165] In fact, my management of his practice continued all the way through the EHR implementation and through to today.

Instead of participating in the JPO cause, however, my husband decided to become an early HMO adopter. Insurance companies paid higher incentive premiums at the time to early adopters. The decision was made based upon a personal study 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 an entire system of change. The force to join the national system was simply too great to resist in rural America. The JPO folded soon afterwards, 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 Health Maintenance Organization (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 would no longer pay for each visit, test, or service they received. Instead this process would be replaced with a standard, pre-paid, monthly/yearly fee to insurance companies that would include most services, no matter how much a patient used them. The physician would be paid for each of his registered patients on the insurance list whether or not he/she saw those patients each year.[166] What would and would not be reimbursed also was predetermined by an insurance review board, thus causing

[166] That meant that 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 unethical practice threatened to challenge the system and for the most part has continued to be an issue that has prevented the non-fee-per-service system from garnering full support. This is not to say that the physicians as a whole were unethical in their standards of usage, but that the possibility of abuse was evident.

physicians to feel that the HMO, not the physician, was determining how to practice medicine. This change lead to multiple other challenges for healthcare including the introduction of "referrals," which are written orders from primary care physicians for permission to see a certain specialist for care in order that the plan will pay for the service.[167] The referral's use then was even more common than it is today. Many physicians in larger practices were forced to hire separate personnel for doing that job alone. Over time the use of referrals has diminished with fewer being expected as part of the healthcare insurance requirements. Nevertheless, costs were not reduced by adding this extra layer of paperwork; and referrals, if still necessary, have now been replaced for the most part by electronic submissions through EHRs.

As this example indicates, rural areas did not feel the effects of HMO laws until many addendums were made and 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 practices. This frightened many who feared a sort of "takeover" was in effect with insurance companies mandating how physicians should practice medicine.[168] By the time that EHRs came along with the HITECH Act promising "change," the older rural physicians' memories were already raw, and they remained 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 past memories of

[167] See Healthcare.gov for basic explanation of referrals at https://www.healthcare.gov/glossary/referral/.
[168] This fear was heightened in the 1990s as echoed in the "Institute for Health Freedom" publication of March 29, 1999 (Brase).

government interference with what the physicians perceived as their professional expertise and basic practice of medicine.

It is important to acknowledge this impending fear at the heart of older and even some younger physicians who are acutely aware of this history.[169] To join too early means to give up a portion of anonymity; yet not to join soon enough, means to lose all of the incentives offered by the government and to face even worse penalties for not adopting EHRs as time goes on. Yet at the heart of all of this is the fundamental desire to be an effective, knowledgeable, “good” physician despite what the political or socioeconomic climate within the medicological environment seems to want. Physicians desire to do what is best for their patients, but they think that what they already have been trained to do *is* what is best for them. As the government and insurance companies again mandate change that could be as challenging as the last major healthcare laws of the HMOs, it is little wonder that physicians experience doubt, fear, and caution. Medicine is a slow-to-change, conscientious profession. Resistance is inevitable.

4.1.2 EHR Choice and the Insurance Dilemma

To add to this, along with the struggle to find the best EHR product, emerging regional hospital “wars” exist in Johnstown. The term, “wars” appears to be harsh, but it is a common term used in the region to discuss not only the turmoil and competition in the rural hospitals but also that which is going on in the urban areas as well. Urban affiliations affect rural ones. For instance, hospitals are being “bought out” by each other as each affiliates with a different preferred insurance program. In the Pittsburgh metropolitan region, UPMC Health Systems, for instance,

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[169] See Jerry and Patrick Gray interview below.

use their own UPMC Health Insurance. Allegheny General Hospital and West Penn Hospital mainly use Highmark Blue Cross and Blue Shield insurances.[170] The hospital associations affect the insurance accepted, and that affects the urban hospital affiliations that bleed into the rural areas. For instance, two local hospitals just outside the Johnstown region are now affiliated with UPMC Health Insurance. They are UPMC Bedford Memorial and UPMC Altoona. Additional affiliations have continued even as recent as September 2, 2014 when 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 occur, the question of what health insurance policies will or will not be accepted continues to concern patients and physicians alike as this "war" or competition between hospitals and insurance companies continues—with no real promise of stopping.

Directly or indirectly, affiliations also influence how these hospitals interact, what EHR system is used, how interoperable the EHR systems are with each other, and what the preferred affiliations are of smaller businesses and/or solo practices in the region. Like any system, it is all interconnected. One cannot examine the state of affairs of EHRs in the Johnstown regions, for instance, without taking note of such alliances with hospitals and insurance companies. The medicological environment is not only about whether or not to *use* EHRs but is even more about

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[170] Please note that many of these hospitals, despite their *preferred* insurance, do accept other insurances. The point of this discussion is not to imply an "all or nothing" acceptance but rather to show that affiliations have power and that power also affects the environment in both rural and urban areas. In rural areas, however, the choices are fewer. That is, if a major hospital such as Duke LifePoint comes into a region (as it has in Johnstown's Conemaugh Health System), it may limit and control insurance acceptance. This is an underlying concern of the various physicians and smaller regional hospitals of the Johnstown region in particular. This is one key reason for their desire to unite. Acceptance of insurances and use of EHRs both are related in that they affect how well rural physicians in particular can freely navigate the environment while still surviving as private physicians.

which is the best product for interoperability, how this product might serve the needs of the facility, what costs are involved, and who can access the information.

Many feel the larger healthcare systems are “fighting” in a “war” to seemingly “shut out” the small solo practices. EHR systems strongly fall into this mix of concerns since which system is being used could minimize interoperability with smaller, independent practices. For physicians to have direct access to the hospitals to which they prefer to admit, they must be able to access the EHR system even if it is not compatible with the one they use in their private office. If, however, the physicians work for the hospitals, many times the EHR system that the hospital uses is already in the outlying hospital facility in which they work. This is a serious factor in how effectively and smoothly EHRs will be adopted in rural regions. Changing an EHR system is no easy matter. It is expensive, time consuming, and stress-inducing. To transition to a different EHR system might be possible for someone who works for that hospital but certainly not as easy to deal with for someone who does not. Herein lies the complicated problem of EHR adoption.

As yet, my husband’s practice has not joined any healthcare system. He has purchased his own EHR and continues to use it. But the challenges remain. The climate remains 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 is available for large and small practices, so it seemed to be the most logical choice at the time. However, now that Conemaugh Health Systems have been bought out by Duke Lifepoint, Epic is their EHR of choice. Now we cannot use the Epic system because it is only sold to very large facilities. The only way our system and Conemaugh’s can be fully interoperable would be for us to sell our practice to Conemaugh, become employed by them, and then likely have eventual rights to the Epic system. There is no guarantee.

Amazingly, *the choice of EHR medium is affecting the decision making behavior of physicians within the environment.* These are real financial and feasibility concerns. Certainly all this reinforces the point that this environment continues 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 elects to join the hospital as one of its employed practitioners, the physician would likely get the Epic EHR he or she wants but would also have to abide by the insurance stipulations (which ones will or will not be accepted for payment) that the hospital system employer mandates. That is, insurance issues in relationship with EHR systems are all part of this environment and add to the complexity of the related choices that must be considered in making careful decisions within the system. At this time, because of the complications associated with these convoluted decisions, the environment from the physician perspective is a challenging, perplexing, and frustrating one. Larger systems almost hold smaller systems hostage with EHR vendor choices and related health insurance preferences at stake. Now for many, the EHRs stand as the central issue of control.[171] This shows the overall level of

[171] For instance, smaller surrounding hospitals such as Somerset Hospital have looked towards joining larger facilities like Conemaugh Health System which is affiliated with Duke LifePoint just so that they can access the Epic system of EHRs. To many, Epic is 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. 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 is allowed to join the hospital Epic system without first joining affiliation (i.e., management/ownership) with that larger hospital system. The trouble is that with this transition also comes 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 be forced to abide by any insurance limitations that Duke LifePoint has to offer. This complicates matters and decision making considerably.

influence that the EHR in particular holds. Small solo practices cannot gain access to the product without joining larger, hospital-associated practices.

4.1.3 The Rationale for Study

With all this in mind, the path towards 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.[172] There is a need to explore this environment systematically through the use of other physicians who have lived experience through primary contact with the EHR transition within the medicological environment.

The next sections address physician perceptions in two ways: first through oral history interviews and second through anonymous surveys. In the first case, a number of rural physicians from the Johnstown area are 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 medicological 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) are used in an

[172] 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' office but did so out of financial and practical necessity. 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 the 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.

effort 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 take a broader glimpse at this particular 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 are introduced to online communication within rural areas. The functional means for this introduction is the implementation of EHRs, the medium through which physicians and patients are able (or will be able) to communicate securely and actively. As discussed in previous chapters, active use of online communication within the healthcare arena depends on the means for providing secured messaging. Unless physicians accept the EHR medium, it is unlikely that online communication will not become the norm due to the need for having a broadly available secured system for transmitting these messages. Therefore this research attempts to examine 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 begins the process of studying this varied, diversified environment and likely will lead to more questions than answers about the composition of this unique space at this given point in time. It is a study of the environmental climate within which the electronic medical messages enter and begin to become accepted as a normal part of physician/patient relationships.

4.2 ORAL HISTORY INTERVIEWS OF PHYSICIANS[173]

At noon EST on January 20, 2009, President Barrack 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

[173] See Appendix A for the Deed of Gift used for all interviews herein discussed. This document, when signed, provides the interviewer the copy right to the audio files. That is, it allows the researcher to report on the information in writing and/or in oral presentations as designated by the narrator (person being narrated).

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 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.

4.2.1 Rural Physician Case Study: A Practice in Transition[174]

4.2.1.1 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. If that were the case, 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.[175] 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

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[174] Although additions have been made throughout this segment, original guidance for this research segment was facilitated through class instruction by Dr. Ronald and Mary Zboray of the University of Pittsburgh Communication Department in their course on media studies (COMMRC 3326). Additional versions and revisions of this research were also 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.

[175] It is to be noted that the motivation for studying the 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

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 who produces the programs for the 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 the vendor, Allscripts, for their practice groups and for the hospital itself (as hospitals are also part of this mandate). 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 in an attempt 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 primary care physicians because this group had the greatest population of long-term patients who had a higher likelihood of developing long-term relationships with their physicians. If the goal is to study online dyadic physician/patient interactions, then a primary care practice would be ideal since it is the most likely group to nurture such a relationship. “Primary care” includes general practice, family medicine, general pediatrics, general internal medicine, and general obstetrics and gynecology (OB/GYN).[176] These practices typically see 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 tend to be the initial contact, the ones who "refer" (and are often required to refer for insurance company purposes) patients to specialists if needed. For insurance purposes, this group falls under the category of "PCP" or primary care physician.

Specialists are also required to adopt EHRs, but their clientele tends to be characterized by fewer long-term relationships (with chronic conditions being an exception). Typically their EHR systems do not tend to be as complex in that they mainly involve one specialty instead of multiple ones. This difference is significant in studying the effect of EHRs on the PCP versus the specialist since the complexity of the systems are widely different. For instance, a podiatrist would 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).[177] PCP EHR systems tend to be much more complex in that they cover a wide range of interrelated illnesses and treatments that facilitate the necessary narrowing, exploratory process of a PCPs diagnosis.

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[176] These specialties are considered the "generalists." There is some debate as to whether or not 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.

[177] Knowledge of this comes in particular from personal discussions with a local podiatrist in the spring of 2009. He opened his computer program for my husband and me in an effort 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 and largely since it 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.

As a result, adoption of EHRs for PCPs is much more challenging (and often resisted more) than for specialty practices.

In short, a number of 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,[178] and (4) transitioning from paper to electronic charts for the first time (i.e., without prior, first-hand 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 particular group right in the midst of a national transition provided insight into what others may experience 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 towards more online interactions provided a means of investigating the thoughts, considerations, decision-making processes, emotions, fears, anticipations, and overall experiences of those who were making and would be making this transition. Granted, a group such as this who elected to make the transition would be somewhat different from a group who was forced to do so. However, it is hoped that this

[178] This can be a tricky designation since many physicians though considered "independent" may have some financial association with a hospital. For instance, independent PCPs still have admitting privileges to hospitals or may be directors of nursing homes or hospital facilities that are associated with a hospital. The key in this selection process is that the physicians make their own decision about the EHR purchase for their own practice. The decision is not forced upon the physicians. This type of independent practice has been referred to as a "dinosaur" in medicine today since so many private practices are being forced into large group networks under the direct employment of a hospital. Key here again in determining the scope of this observation is that the physicians are independent in making their own practice decisions, namely to purchase and implement their own EHR system without the direct influence of a hospital employer.

research will provide assistance and foresight for those who are continuing to respond to the requirements of the HITECH Act of 2009.

4.2.1.2 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?"[179] 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 towards EHRs, the struggle to facilitate patient-centered care remained. In making this argument, first the education, training, and past patient experiences of

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[179] All interviews and documentation has been based upon the methodology described by Yow (*Recording Oral History: A Guide for the Humanities and Social Sciences,* 2005).

each of the interviewees were described in an effort to understand 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 in light of participation, education, and overall satisfaction was discussed. Finally, the discussion was summarized with a future look towards communication problems and media concerns faced by these health professionals in an ever-changing technological environment.

4.2.1.2.1 A Motive for Change

After 33 years of practicing medicine with three other primary care physicians, Jerry Gray, MD and his office manager and wife, Maggie,[180] likely would have remained with their partners through retirement had not patient and management concerns become an issue. As Maggie recalls, "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 a 1000 square feet of [*wasted*] space." (Gray, 2009) [181] Jerry explained that this lack of efficiency and accuracy had a direct impact on patient care, safety, and satisfaction. He would ask the secretaries to find a chart on a patient and 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."[182] Maggie 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 Jerry and Maggie emphasized the cost in employee time

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[180] In an effort to distinguish more easily between the father, Jerry; the wife and office manager, Maggie; and the son, Patrick, 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.
[181] Maggie Gray personal interview, Windber, PA, February 28, 2009.
[182] Jerry Gray personal interview, Windber, PA, January 24, 2009.

and wasted office space which further led to their increasing dissatisfaction with their partnership.

During their last two years of working at their previous facility, their son Patrick Gray, MD joined the practice, fresh out of residency. Also an Internist, Patrick expressed his fear of "taking a major step back" when he joined a practice that was "completely unwilling to adapt to modern medicine." (Gray P. , 2009)[183] 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. Pat, 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, Tamara Hoffman, DO,[184] a former Hospitalist[185] in a nearby city who, at age 33, was also familiar with more advanced medical record keeping. Together

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[183] Patrick Gray personal interview, Windber, PA, January 24, 2009.

[184] "DO" refers to Doctor of Osteopathic Medicine. This is in contrast to "MD" which is referred to as 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.

[185] The term "Hospitalist" first was 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 spend all of their time 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 Grays' admit), or is not yet accepted. Prior to 1996, his profession did exist in the 1970's and 1980's but it was not labeled as such. By the late 1990's, 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.

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.

4.2.1.2.2 A Patient Response to the New Media

From day one Gray 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. Tamara noted that some did not "have any idea I even use the computer" (Hoffman, 2009)[186] and Maggie agreed that some "are not quite savvy enough to understand." However, for the most part, each narrator[187] 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. Maggie stated that "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 Jerry 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

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[186] Tamara Hoffman personal interview, Windber, PA, February 28, 2009.
[187] The term, "narrator," refers to the person who is being interviewed. This is a term used in oral history research and will be used throughout this dissertation.

summaries right in front of the patient.[188] At first each of the three physicians tried taking the computer into the room with Jerry 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. Tamara and Jerry said patients would come right out and say, "Are you listening to what I am saying?" or "Hey Doc you have to look at me." Patrick 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.[189] 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. Jerry, however, said he was again reconsidering using his laptop in the room because it was a "project

[188] One of the most popular word recognition programs 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. Jerry Gray 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. Jerry's system at the time of this interview, however, was not yet equipped to place the information automatically on 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 acquires the more advanced EHR program, the scanning procedure will be eliminated and the dictation will go immediately onto the electronic chart. With or without the scanning step, Jerry felt this method facilitated physician/patient communication and improved accuracy of data entry.

[189] A number of articles have 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 include, "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); "The Influence of Electronic Medical Record Usage on Nonverbal Communication in the Medical Interview" (McGrath, Arar, & Pugh, 2007); These articles specifically discuss 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 will no longer be as common in patient rooms as convertible laptop tablets are becoming the norm. Due to their ability to fold into a flat writing surface, they have the potential of at least minimizing the physical barrier between the physician and patient, depending upon how effectively the physician manages to look at the patient while typing in notes. The fact is, however, when a computer screen is present in the room, the medium itself affects the effectiveness of the message being accurately transmitted.

in evolution" that in the long run might best facilitate patient satisfaction and education when used appropriately.

Jerry insisted 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 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 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.[190] Besides these reasons, Jerry said patients edged 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.[191]

Although none of the physicians felt comfortable communicating with their patients on email on a regular basis due to liability and safety issues, they did spend a considerable amount of time discussing the importance of educating their patients on Internet information and use.

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[190] Tamara 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."

[191] Since the time of this study, I have had several follow-up conversations with Dr. Gray. He recently retired from active practice, but until that time, he felt strongly that he should not bring the computer screen back into the patients' rooms. This seems 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 is remarkable about this physician is his willingness to try new things and his skill at using the computer despite no formal training even in typing. He has continued to be a model for area physicians with his suggestions for how to adapt to online communication and the EHRs.

Tamara stated she regularly directed Internet users to specific websites and welcomed patients to bring in outside information. Jerry 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 Patrick and Tamara 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. Patrick 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 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.[192] He added, "People realize we are all human, and we are not able to store all these things in our minds." He adamantly

[192] Patrick 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." Patrick feels that the use of electronic materials are 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."

stated that there must be cooperative, educational, and open communication with the patient at all times 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.[193] Interestingly enough, it was the middle aged patients who were identified as having the most problems with the paperless system brought on by the EHRs. Tamara 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?'" Maggie also described a case with two elderly patients and their fifty-year-old daughter:

> Patrick uses a clip board with him with copies of his own progress reports. The guys have the ability to bring the EMR[194] 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. Patrick 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

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[193] For a fascinating case study that captures 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).

[194] In this dissertation, the term EHR has been used as opposed to EMR. The former is the more general term standing for Electronic Health Records and the latter the one, more commonly used among the physicians particularly in this practice, is a similar term used typically interchangeably referring to Electronic Medical Records. In the past distinctions were made between these but I have found that most who use them mean one and the same thing now.

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 are often less accepting of the EHRs than the elderly patients either because the latter are more trusting or because they do not notice the absence of the charts.[195] 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 the EHRs outside of the room but also how the patients could use their own computers to seek accurate medical information.

4.2.1.2.3 A Look to a Future of Continued Challenges

At the time of these interviews, the Gray 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 pre-generated lists and notes to help with payment, record keeping, diagnosis, and treatment options. With a white pen, the physicians could cover checklists rapidly while maintaining eye contact with the patient. They could also generate notes, orders, and prescriptions directly from the patient rooms. In fact, the physicians eventually would be able to

[195] Tamara also supports this notion of middle-aged people seeming to be less interested in adapting to technology. She states, "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 mentions that her mother, also a physician at age 63, refuses to "touch a computer." Tamara says her mom simply says, "I absolutely refuse; I am not doing that."

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 shared, ongoing goal of both the rural and urban physicians.[196] The Gray Medical Group appeared to be looking towards 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. Certainly they viewed the process as a dynamic yet very positive one. Maggie simply summarized, "Since day one, no one complained!"[197]

Upon probing more deeply into the physicians' projections for the future of the EHR and technology in general, I found that certain underlying fears and concerns remained. For instance,

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[196] For related articles on this topic of electronic record-keeping in physician offices, the following are helpful: "Implementing an Electronic Medical Record in a Family Medicine Practice: Communication, Decision Making, and Conflict" (Crosson, Stroebel, Scott, Stello, & Crabtree, 2005); [196] "Copy-and-Paste," (Hirschtick, 2006); "The Patient-Owned, Population-Based Electronic Medical Record: A Revolutionary Resource for Clinical Medicine" (Rashbass, 2001); "Electronic medical Records: A Decade of Experience" (Safran, 2001). Note that these articles review the current landscape of electronic record-keeping in physician practices at that time. They do not represent all of the articles that came out after this interview was done, which again allows for the perspective of the physician practice at that point in time in 2009.

[197] Maggie discusses that the EHRs are especially needed when their patients go to Florida for the winter. She states, "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 means that information can be located and faxed quickly from one office to another state. She also says when EHRs become more global, the speed and efficiency will increase even more. It is likely that Maggie is referring to the interoperability of EHR systems, which is a goal of the electronic records. In such an instance, the faxing or scanning of information online is no longer necessary. Rather, direct access to patient chart information may be able to be located by the patients through their own access code into the EHRs. Likewise, interoperable systems that clear HIPAA regulations may afford physicians to look at charts across the continents with the permission of the patients and the physicians who create the charts. This is not yet fully possible; but the systems are beginning to adopt and develop this technology. For instance, the Veterans Affairs (VA) hospital systems are interoperable between VA hospitals. This is the goal for those who seek interoperable EHRs, only on a world-wide basis. It is possible Maggie is referring to this; however, most likely she is just thinking about the scanned and sent information. Even that method is much faster than sending something via the postal service.

Tamara warned against patients relying too heavily on Internet information acquired from weak or difficult-to-understand websites. She said 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.

Tamara along with Jerry and Patrick believed the future success of patient technology usage would depend upon effective physician-patient communication. She said she felt it was important to first ask patients if they had Internet access, determined what websites they used, directed them towards useful sites and blogs, and instructed 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 felt that 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 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 Patrick 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 multi-member 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.

4.2.1.3 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 depends 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 a successful transition from a paper to a fully paper-free practice. When viewing the office, it seemed almost naked without the ever-present rows upon rows of charts 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-edged manner. This group might be a sample of "rural America," but it certainly appeared to be a busy, devoted practice committed to patient care above and beyond any political or governmental mandates. In fact little if anything was said throughout the entire interview process about the fact that physicians "had" to make this change. In this practice, change was the way of the future and a welcomed one.

Perhaps one might surmise that this scenario is one which the lawmakers had in mind for all practices when the HITECH Act went into effect in February of 2009. 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 and 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-edged 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 make this transition, however, to tout that the practice was truly using the full functionality of an EHR was inappropriate. 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 are typical of current EHRs.[198] This too might be an unfair observation since the practice had no other choice than to record old files through scanning. However, when Jerry 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 makes EHRs so technologically advanced today. That is, voice recognition is merely a substitute for typing information into a chart. What is most characteristic of the EHRs are their wealth of checkbox entries and ability to take the data and run extensive reports on that data. At the time of this interview, such reports were not really able to be run on blocks of word documents. This might be this way in the near future as data mining programs advance to the point of running data collection on narratives, but that was far from typical in the early part of

[198] In all fairness to the Gray practice, they realized that they were in the midst of 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.

2009. Therefore, it is possible that their enthusiasm was more for owning and beginning to use a new technology than it was for mastering the functioning of that technology in fully using the EHR systems. In a sense this example is like owning a new smart phone and showing off how well the touchscreen technology is without at first really understanding the many, many capabilities of that new phone. The Gray's excitement may have been about having a new piece of technology perhaps even more than about knowing how to use that technology to its fullest. How advanced the Gray practice was, depends upon what vantage point from which the observation is made.[199]

Third, it must be kept in mind that this is only one observation of one practice in one rural community of the U.S. Not all communities are alike. All may have 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 can range in definition from being anywhere less than 2,500 people. In fact, the U.S. Department of Health and Human Services stated that "The Census does not actually define 'rural.'"[200] 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

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[199] Nonetheless, the Gray practice demonstrated a complete transition from paper to electronic charts, something that many practices in transition never quite achieve. My husband's practice, for instance, did not choose to scan all of the charts because it did not want to convert those of very elderly patients whose charts were often two or more binders in length. At the same time, although the Gray practice made a complete transition to paperless, it did not and actually could not convert to full digitization of old charts since those could only be scanned. The move to check boxes and/or fully dictated/typed charts into the system would 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 may more easily be used for data mining and may more readily face the challenges of data privacy issues. Likewise, checkbox data entry would fully change the way the Grays interacted with patients and would appear to be a major departure from their face-to-face interaction with patients. All in all, the Gray practice impressed me with their pride and commitment towards this medium. Few if anyone uses all of the features on EHRs. For the Grays to convert to no papers from the start, shows commitment and willingness to transition into the more digitized formats in years to come.

[200] See http://www.hrsa.gov/ruralhealth/policy/definition_of_rural.html. This information comes directly from the Department of Health and Human Services website under HRSA (Health Resources and Services Administration). It was retrieved on August 17, 2014.

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 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 future 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 Gray’s practice was assessed in 2015 or 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. Such observations are limited and therefore allow for only limited conclusions to be drawn. The Gray practice simply was not representative of all rural family practice offices. However, 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.

4.2.1.4 General Conclusions from the Gray Practice Experience

All in all, transforming a rural office practice to a high-tech facility affects both physicians and patients on multiple levels. Although many perceived benefits have been identified by this particular group of practitioners as well as through ongoing, scientific-based studies, many challenges in maintaining patient-centered care remain. For now, most studies focus on the practical issues of patient safety, upfront costs, practice management, and patient education.[201] Media literacy remains a concern not only in light of patient users but physician users as well. Without both being on board with the changes within the medicological environment, it is questionable as to whether or not the EHRs and eventual online communication within secured portals will develop to the extent that some hope. As the whirlwind of change stimulated by the American Recovery and Reinvestment Act settles, the question remains as to how this change will ultimately affect the quality of the physician-patient relationship. In 2009 the concern was over the *presence* of a computer, but as the 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 likely will be more about how physicians and patients are communicating online than about the mere presence of the computer in the office. The environment continues to change. This observation provides a

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[201] Three excellent books that explore 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).

single recording in history of how one practice began this process. A reexamination of this in years to come, may reveal different concerns and very different responses from physicians and patients alike.

While governmental mandates rely on technology's ability to "save" healthcare, the real question is will these changes improve, limit, or alter this most fundamental relationship? This study begins to addresses this question as it provides insight into the ever-changing responsibility physicians have in helping their patients adapt to media literacy issues while maintaining optimal patient care.

Advanced technology is inevitably permeating healthcare at an unprecedentedly rapid pace.[202] This reception study reveals one group response to change in a single, rural practice of primary care physicians. This transition across America will indeed be encountered one patient, one physician, one practice, and one community at a time.

4.2.2 Rural Physician Interviews: Broadening the Perspective

Although the case study on Gray Medical Associates, PC provided insight into the workings of a particular practice in transition, additional observations may afford a broader perspective not only on rural physicians in general but on 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 might play a

[202] 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 continue to surface within the medicological environment today. Please see "Use of Electronic Health Records in U.S. Hospitals" (Jha, et al., 2009).

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, Gray Medical Associates, PC represented the entire physician staff and the wife/office manager: There were two, male, Internal Medicine, medical physicians (MD).[203] Jerry was the senior physician who had been in practice for over 30 years and Patrick, his son, was in practice for less than half that amount of time. Tamara, a female physician who worked in the field for under 10 years, was a Family Practice physician with a Doctor of Osteopathic Medicine degree (DO). Maggie, was the wife of Jerry and was the office manager, not a physician. All members of this group came from a previous practice except for Tamara who started new with the Gray 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 section, is to go beyond this single practice perspective in an effort to provide further insight into the functioning of the medicological environment at the time when EHRs were beginning to be mandated. 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.

[203] It is to be noted that Gray's practice has changed since 2009 with Jerry for the most part in retirement and additional associates hired. No follow-up analysis was made of this group other than casual conversations with Jerry and particularly Patrick who shared with me that they are still "on top" of the EHR mandates and moving forward.

4.2.2.1 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 after the HITECH Act had come out. Their motivation in doing these interviews was merely to facilitate this project in understanding 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.[204]

Unlike the Gray 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 particular 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

[204] 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 actually preceded this award in anticipation of this project during the spring of 2009. Additionally, in April of 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 dissertation, parts of these interviews were referenced in general in various talks and conferences and in particular at the Oral History in the Mid-Atlantic Region (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."

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 yet 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 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.

4.2.2.2 Subject Identification

The first narrator, Diana Denning, 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.[205] She was a member of a previous OB/GYN group practice at Excela Latrobe Hospital in Latrobe,

[205] Currently Diana 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. At this time 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 Diana over the past 6 years since the original interviews. She is the only one of the four narrators with whom I have maintained in contact.

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, Allscript; but no determination had been made officially. She seemed, however, to want to be very involved in the decision-making process. Overall, Diana 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. Diana was the only OB/GYN interviewed for this study.

The second narrator was Richard Kastelic, MD of Richard Kastelic, MD and Associates PC. He was a Family Practice physician who owned, managed, and directed an independent group of seven physicians and four certified Physicians Assistants (at the time) along with multiple support services (such as x-ray equipment, blood laboratories, etc.) that were located on the Berkley Hills Professional Campus, which Richard owned and operated. All physicians working for him admitted to Conemaugh. At the time, Richard 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 screen 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 Richard's narrative—as with all narratives recorded in this study—speaks only to how he viewed the circumstances at that particular point in time.

The third narrator was Michael Warner, DO, of Warner Family Medicine, PC. At the time he practiced with his wife, Margaret Warner, DO and both were Board Certified in Family Practice, Neuromusculoskeletal Medicine and Osteopathic Manipulative Medicine. Also at the time of this interview, the Warners practiced at two locations, one in Richland and one in Ebensburg, though now only the Ebensburg location is listed on their website.[206] Michael 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 Michael and not Margaret was interviewed. It is important to note that Michael 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 Dennis Eckles, DO, who had practiced in Seward, Pennsylvania with over 35 years of experience and admitted over the past years to both Conemaugh Memorial Medical Center and Indiana Regional Medical Center. His business was called Valley Ambulatory Health Center and he was Board Certified in Family Practice and Geriatric Medicine (for elderly patients). At the time of the interview, he was also in practice with another

[206] As of fall 2015, Michael was still practicing in Ebensburg but under the umbrella of Conemaugh Health Systems/ DukeLifepoint.

osteopathic physician. Dennis stated he was one of the first physicians in the region who applied for designation as a "medical home,"[207] which was his newest venture at the time of this interview. His practice had had an EHR system in place for a number of years, and he seemed to be quite computer savvy as he explained how his system worked. 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 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 Gray 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 and the new governmental mandates.

4.2.2.3 Methodology: Oral History Study

The procedure for conducting the interviews was similar to that followed in the Gray Medical Associates, PC case study. All interviews were recorded electronically in the presence of each

[207] According to the Journal of General Internal Medicine (Stange, et al., 2010), the Medical Home is defined as "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 is a relatively new concept in healthcare today; and because of Dennis's decision to apply for this program despite his advanced number of years in practice, shows that he is likely a very forward looking physician who is quite aware of the advances and developments in medicine within the medicological environment.

narrator with their recorded oral consent for use of the materials for educational purposes. A series of open ended questions were used as a guide; but for the most part, the questions were self-directed by the interview with an intent on finding out (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, the responses helped gauge the flow of the conversation. Follow-up questions were more focused on what the narrator wanted to talk about concerning EHRs and technology. 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 for the sharing of the information, and all expressed curiosity and strong interest in the topic at hand. It was not at all difficult to solicit questions on this topic as it appeared that everyone had a strong willingness to share their thoughts, opinions, and experiences.

4.2.2.3.1 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 to purchasing programs 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 decision making in selecting the EHR system (if not already purchased), anticipated or actual problems with implementation, and overall involvement 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, i.e., the patients should be affected as much as the physicians since this change is change in their care. Then again, perhaps what some of 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 they, therefore, were not yet concerned. The people who had to take the initial step towards 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 Richard, were the ones who supported this observation about patient apathy, stating that the patients appeared almost outside of the situation. In the media, the patient focus on healthcare at the time (and even now) 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).[208] 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 point in time fell on the physician to make the changes. No one was mandating the *patient* to change. The government mandates were being directed towards the *physicians,* as they were the players necessary to push

[208] Please note that these are suppositions and not supported by any data collected from the individual patients' offices. The notion here is to explore the possibilities surrounding the difference of awareness, not so much in identifying for sure what that reason is for each particular office involved.

forward this new technology in healthcare. EHRs did not really involve patients directly during the transition period. 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.[209] When something does not directly involve a person, it may fall out of their 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, the 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 the EHR technology, the physicians did for the most part sound excited about the overall attention to their profession. Of all these narrators, only Dennis had completed the process of full EHR adoption, and he did his conversion well in advance of the mandates. Yet he too realized he might have to make changes as well. In short, the physicians were cautiously excited about the promise of general EHR adoption had for 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 will do

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[209] 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 the city said they did, which ended up being about one person per class of 25. 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. Once the change was seen as something available to them, the patients likely then would be most interested and involved in the use and application of this new technological medium.

to the face of medicine in light of costs, security, safety, basic patient care, and communication in general.

4.2.2.3.2 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. Each will be discussed as to specific comments narrators made and how their concerns relate to what is happening today in the field. In a sense what was found was that their concerns were real ones which tend to continue to exist today. What is so remarkable is that these physician comments almost foreshadow what is happening today, over five years later.

One of the most concerning issues for physicians is the dilemma of time. Any change to their schedule means time lost or gained. When physicians are late for their patients, aggravation, and frustration can become a serious issue for the patient concerning their overall satisfaction and care. When physicians have emergencies, delays due to computer or power failures, or unexpectedly complicated patients scheduled too closely together, the time that patients wait can increase. At the same time, if a physician does not schedule enough patients into a given hour, then this along with the possibility of patient cancellations and over-staffed offices can drive costs up and revenues down.

Time gained and lost can create a vicious cycle, something about which each of the narrators commented. Above all, time factors weigh most heavily in the development and maintenance of effective physician/patient relationships, which in the long run affect patient satisfaction, safety, and overall health (Dugdale, Epstein, & Pantilat, 1999). If EHRs are to benefit patient care and improve communication overall, time needs to be used effectively for everyone involved. 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 is a complex factor in the overall practice of medicine; and EHRs entering the picture inevitably will alter this time factor as well—for good or bad.

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 the EHRs and online communication. Diana and Michael were the two physicians who thought that time would be saved with the use of EHRs. Diana stated that she felt that it would be "faster to do a review of systems, especially with complicated cases." (Denning, 2009)[210] 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 pre-programmed checkbox) and move on to the next point. Michael 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

[210] Diana Denning personal interview, Johnstown, PA, January 22, 2009.

stuff down." (Warren, 2009)[211] Both physicians saw the checkboxes, 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. Michael stated, "There will be more time spent with the patient and less writing." Diana 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 the EHR system 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: Diana stated that "You have to know how to type." and Michael noted, "If you're on dial-up….but pretty much not a factor now." Indeed not all users are good typists, especially older physicians, many of whom have 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 can be for older ones who were not exposed to so much keyboard experience.[212] Likewise, the issue of dial-up versus broadband is quite important as evidenced by the ongoing push for improved broadband coverage in rural areas. It really is a concern for the implementation of EHRs in rural areas even throughout the Johnstown region.

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[211] Michael Warren personal interview, Ebensburg, PA, January 12, 2009.

[212] This is why so many older physicians tend to use word recognition such as Dragon Medical. My own husband uses this. When listening to his dictations into the EHR charts, I cannot help but think I could be typing much faster than he speaks (and then corrects and re-speaks). This is a definite concern for older physicians, at least in my general conversations with them. This is why Jerry Gray used the dictation system while his younger counterparts did not. They typed directly into the system.

Even more importantly, Richard made a very pointed comment about the 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." (Kastelic, 2009)[213] Richard is referring to how physicians have to read the notes pre-entered into the EHR system upon entering the patient room. Previously nurses simply stated the condition of the patient briefly in the chart and on his way in, saving him the time of reading over all of the electronic data entered into an EHR and trying to find the most pertinent information. It is to be noted that physicians are responsible for the data entered by their staff. They are liable for what has been entered, and they have to "sign off" on these entries indicating that they did read them and approved of their accuracy. This again is a slippery slope in that a lot of electronic information is produced and documented by nurses and other staff members. The systems themselves provide long lists of checkboxes that need to be covered pre-exam by the staff member who is preparing the patient for the physician. In fact there is so much documented that the physicians may have trouble reading it all within the *time limits* of the office visit. Without key information highlighted verbally, they run the risk of missing something. So again it is a time (and in turn liability) issue that poses extensive concern within the office.

Richard also noted another common concern for how EHRs can be delivered (which was fully discussed in the previous chapter). All too often physicians fall prey to the temptation of copy/pasting large sections of text from one chart to another. Some have appropriately referred to this as "sloppy and pasting" (O'Reilly, 2013). Others do an altered version of this on voice recognition systems by "code dictating," which allows the dictator to say a single word or phrase

[213] Richard Kastelic, personal interview, Johnstown, PA, January 21, 2009.

and an entire segment of commonly used information types automatically into the system.[214] 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 Richard states, the possibility of error in communicating in this fashion is 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 law suits. Thus, Richard makes a strong and valid point about how the EHR documentations are being misused. However, if they are used correctly without this copying and repetition, the EHR can be quite effective. This suggests that the problem has more to do with user issues than medium deficiencies. If such short cuts are being used to save time, then how much time will be saved if the patients' care results in injury, misdiagnosis, or death? Resulting law suits also take a lot of time (not to mention money).

Time certainly is a factor in this environment, especially if time becomes a limiting issue when using the EHRs during patient visits or even after hours when unfinished electronic charts

[214] This is the practice of training Dragon Medical to write automatically a common set of words or even paragraphs by stating a code word like "mother." This was demonstrated to my husband by Jerry Gray when we visited his office on a separate occasion to learn how to use the word recognition equipment more efficiently. Jerry had many codes he would say that would type various pre-written, standardized texts onto the electronic chart. The practice is very similar to writing the same thing over and over again or copy/pasting information. The problem is that this practice may be more efficient but it can easily be a dangerous substitute for individualized documentation in the care of the patient. Granted, some information used is repetitive language, but if this language is used too repetitively, it can be almost forced outside perceptual awareness. The danger is becoming so used to the common wording that differences are missed and patient safety is at risk.

are being completed from that same day's patient load.[215] Time most definitely is a concern for many physicians attempting to adopt this new technology (Poissant, Pereira, Tamblyn, & Kawasumi, 2005). In fact, if so much time is being used in entering data, how much time will there be left in a day for physicians to respond to electronic messages once the secured portals take hold? This is a legitimate concern. Time indeed will affect how well this new form of communication within the healthcare profession will ultimately survive within the medicological environment—with or without electronic medical messaging.

The three physicians who had not yet implemented their systems (Diana, Michael, and Richard) 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. Richard 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 are well thought out, many have found that more than one EHR is used before the practice (or hospital system) is satisfied with functionality of the system.[216]

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[215] This I can account for first hand through observations of both my husband, daughter, and sister-in-law who spend a tremendous amount of time each evening after hours catching up on patient data entry from the day before. If EHRs are supposed to be saving time for physicians, then why is this happening to so many? This issue likely will be written more and more about as time goes on and physicians open up about their difficulties. Saying that they are not "keeping up" may make them appear to be failing the system. After all, medical school constantly promotes speed and efficiency during training. Older physicians who find themselves slowing down considerably due to the new medium may not be as willing to tell this to many others. My husband is one of these cases. He spends in excess of at least five to seven additional hours each day on charts, and he is always saying he is far from catching up. This is a problem, a time problem; and it is a real issue when using EHRs. If this is the case with many physicians, then how will they have time to respond to electronic messages within the EHRs too? Technology is moving very rapidly; but the medium just might be swallowing up the users.

[216] Please note that it is not known what system the Kastelic practice ended up choosing. Many factors were in play with his decision, but his concern, he stated, was not interoperability with the local hospital system. Perhaps this was

Although the situation with costs and EHR changes was discussed in part in Chapter Three above, it is important to note that the situation continues 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 is 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 is whether or not the costs will be made up by the number of patients seen. Even this is a huge concern when currently most physicians are reducing the number of patients seen per hour due to their inability to adapt to the demands of the EHR programs. An example of this is cited in Verdon (2014) in which a provider states that previously 32 patients were seen per day per physician with the help of one technical assistant and now with EHRs only 24 are seen with four technical assistants. As stated in the previous chapter, costs per physician to transition to EHRs is quite startling and not all physicians once converted are all that happy with this process (Verdon, 2013). Today, 67% of the respondents to a national survey conducted by a 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 is the case, then costs not only are concerning in light of the initial decision-making process but also concerning the possibility of having to make a second EHR purchase in the future.

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just as well since Conemaugh Health Systems have begun the process of converting from Allscripts to EpicCare, which according to *Medical Economics's* 2013 data (*Economics*, 2013) is 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 is an example of how many institutions and physician offices have changed their EHR systems, despite the time, cost, and energy involved. Many reasons force this change, but in the end the process is all part of the medicological environment—a dynamic one indeed!

Richard 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. Again he stated that he felt patients may not even want online access, indicating that they are not the ones driving the medium and the physicians are not either. To Richard, it is the government who is forcing this transformation; and he apparently was not happy about this.

Michael 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 implies by this is again that patient care is 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) are determining reimbursement levels for care. In order to break even or make any profit, the physician must show that he is doing a certain amount of work to merit a certain reimbursement level (represented by an ICD-9 or ICD-10 code that the system reads and records in the EHR). How much physicians reports that they do provides the evidence for how much they get reimbursed for their work. Michael is not beginning to suggest that he himself is scamming the system, rather he is saying that the pressures imposed upon physicians are forcing them to have to know how to represent what they are doing through the EHR coding system in an effort to get paid for what they are doing. This factor was not something that Michael had bargained for when he made the decision to convert to electronic records.[217]

In terms of security and associated liability issues, all of 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 have been ongoing concerns about breaches, laptops being stolen, and outside sources stealing identities. For example, hackers made headline news with the August 18, 2014 United States 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 of 2014. This is an ongoing federal law enforcement problem, and it does not appear to be going away any time soon since health records contain personal information easily used to steal identities for insurance fraud and the like.

Interestingly the hacking issue was only mentioned by Dennis who stated, "If some 16-year-old kid can hack into the computers and put a virus that kills everything, who else can?"[218] (Eckles, 2009). Perhaps the fact that this was not discussed by others may have been because fewer breaches occurred in 2009 than they do today. At the time there were few hospital systems

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[217] The cost factors in the conversion process apparently have played a heavy role in the decisions, selections, and applications of the 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 is easy to see that the costs involved are 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 is not so much for patient online communication but for record keeping, interoperable transfer of information, and data analysis. In fact for some the motivation is merely because it is being mandated by the government through laws. As Richard stated so bluntly above, spending all this time and effort "for people to go online and access it" is not going to "improve their quality of life." So there must be a greater motivation for physicians to spend this money. That might be direct government mandates or mere attraction to technological potential; but for an entire country to be committed to this process, there has to be an impetus greater than patients talking online with physicians. The key here is that the medium of EHRs has allowed for online information recording and information exchange. The end result is the option of communicating online—something that is almost perceived more as an added benefit (to some) than as a motivation for making this change.

[218] Denis Eckles personal interview, Seward, PA, January 14, 2014

and large office practices who 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, Dennis, 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 of 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 Richard 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 seems to support early concerns discussed at the time by Hoffman and Podgurski (2009) in their legal report on "E-Health Hazards" in which they discuss 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 is a primary example of how the environment is directly affected by multiple specialty groups that have an ongoing, direct impact on the responses and actions of the physicians and related healthcare decision makers.

To the narrators, the fear of litigation appears commensurate with the fear of the government finding its way into the electronic charts of patients. Michael 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, Michael seems to imply two things. First, he may be concerned about insurance companies gathering data on physician practices to determine how effectively they are treating patients. Second, he may also 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.[219] Either way, there is the sense that Michael is 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 could be a legitimate concern. Once the control and/or ownership of the chart leaves the privacy of the physician's office, the information no longer is reasonably safe within the walls of the practice. Now the entire world may be able to access the information online with unimaginable (good and evil) consequences. This is why the concern for security and privacy is so great and likely what Michael is concerned with in his response.

Yet, despite these implied concerns, the narrators did seem to hold some hope for the future. Diana stated that with so much data being recorded in the patient chart in every suggested category or list that the EHR provides, there is likely less of a liability concern since "more documentation is there." Dennis also added that "Once this is signed off, it is totally

[219] An excellent example of such discovery of disease cures is Sergey Brin's work in uncovering a potential cure for Parkinson's' Disease as a result of compiling data from patient questionnaires (Goetz, 2010). See also Chapter 6. This is the sort of thing that the government and/or insurance companies could do with patient data that Michael is so concerned about. Who owns this data, who has the right to examine it, how it can be used, and the like are all concerns about the use of what is in the EHR.

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 are as permanent and unalterable as sent emails. There is no way to retrieve and change them once they are submitted or "sent." The electronic chart must be "signed off" on by the physicians both for their own entries as well as their staff's. In doing this, it acts as proof of review and final documentation. If something is entered incorrectly, it is difficult to make the change and the "trail" of trying to make that change is likewise documented in the electronic chart.

Currently, with the use of the secured portals, EHR use is quite similar to the idea of recording electronic medical messages within the chart when the secured portals are employed. The message is received by the practitioner, read, signed off on as "received," and then becomes a permanent part of the chart. According to Dennis, this is an advantage in that it is living, lasting proof that what is written has not been tampered with or altered in any way. This he feels will be an asset in the court of law since everything is fully and completely documented. He states that all information is likewise "easy to find, easy to read, organized, efficient." This seems to be a plus overall from the standpoint of liability, at least in the eyes of Dennis and Diana. The others are not as sure as to whether legal problems are in any way thwarted by the presence and use of the electronic chart. Certainly there are both positive and negative factors that those who adopt this new medium have to consider.

Similar to the discussion with Jerry Gray in the earlier case study, the idea of bringing in computers into the patient room seems to be a concern with these narrators. Some have tried it and not liked it. Dennis says, "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 sees the patient instead of during the interaction. This reveals an interesting parallel between Jerry and Dennis 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 pre-test 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. Dennis 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 Dennis is an Osteopathic physician who believes 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 Dennis, practicing medicine is about the physical observation and manipulation necessary to provide outstanding care. He chooses to leave his computer outside of the room because he feels that will afford the best possible care for his patients.

Others agree with Dennis's concern. Richard comments, "Seeing, touching, feeling, and listening to [your patient] is more important than to work on pushing buttons in an [EHR] system." Michael also contends that there is an "enormous amount of attention to the computer" when it is 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 Richard and Michael had not yet fully implemented their EHR systems, but it appears that they were not convinced that using a computer in the room with the patient would be an advantage.

Finally, only Diana seemed to be at all receptive to the idea. Her thoughts were that physicians need to be open to this change and experiment with what works best. She believed 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 towards finding a "happy medium." She said he had already taken her laptop into a patient room, and as yet 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 the interviews. Whether or not they simply wanted to end on a positive note, there were a number of 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. Richard, 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 need to explain test results and health issues visually to their patients in an effort 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 Jerry had in the previous case study in which he did the same thing but with his own computer laptop. He said he sat next to the patient on the exam table, showing them things on the Internet to help explain their problems. With a 46 inch screen or an 18 inch one, the results are the same. Physicians apparently feel that the Internet and information available in the EHRs can be great facilitators during the patient visit.

This notion of working with the patient is carried through even outside the office visit. As Dennis states, "We need to teach information and how to seek it." Diana also adds, "Do no harm means to inform them, to keep them away from bad information." The idea is that patients can look most anything up on the Internet; but if Internet information is not accurate or is incomprehensible, it will not benefit the health or well-being of the patient. Clearly the role of "teacher" seems to be coming through the narratives of these physicians. They do not seem to be at all opposed to patients understanding their health issues; they just don't want to supply information in the electronic charts that could be misinterpreted since the chart is written in a format that is more intended for the physician than the patient.

This problem has been formally addressed in the literature as well and supports what these narrators are saying. Holmes (2011a; 2011b) has written two articles which help to outline how physicians should document information inside of the EHRs in a manner that facilitates convenience, clarity, good organization, and legal savvy. The patients' involvement in the charts is also mentioned. Holmes (2011b, p. 34) notes that some providers similar to Richard are 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 exists; however, people reviewing their own charts can in some cases be helpful in that they can catch errors, provide clarifications, and add information that might be helpful. Holmes believes that the benefits can outweigh the limitations.

As Diana supports, “…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 or unhappy this level of participation appears to be, it is a level that is afforded in the EHRs, especially now during the incorporation of the secured portals.[220] 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 the EHRs. Holmes further discusses how these portals, which are 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, pre-examined information could be delivered to the patients as pertaining to their individual healthcare needs (2011b).

Interestingly enough, another aspect of online communication also pertains both to patient involvement and physicians as teachers. Diana expressed her feelings about EHRs and

[220] 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 Two, 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.

online communication by stating that physicians need 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 believes that those patients who are interested in emails are in fact "interested in their own care." She says, "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 feels this approach is most important for complex cases. She states, "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 feels she understands their problems more clearly and the patients feel more responsibility in helping her understand. She adds, "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 Diana, the email or electronic message allows for improved, extended conversation. Granted not all physicians feel this way. In fact Richard stated, "In our practice, no emails. You call me. …it'd be a full-time job." They may not be for everyone; but they are becoming a mandatory part of the HITECH Act requirements—like them or not.

Even if not everyone is 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.

4.2.2.4 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 Gray Medical Associates, PC case study as well as this additional series of oral histories, reveal that these physicians possess 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 represents only those physicians who were making the decision to use EHRs at that given point in time. Those physicians who have as yet 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 is 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, years after the initial implementation phase, might result in somewhat different findings. New technologies exist now, the EHRs have been tested and improved, and secured portals are well on their way to becoming an active part of electronic medical messaging. 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 be as vividly recalled. To capture the voice of these physicians at the time of the transition is very important and worthy of consideration as part of an ongoing inquiry into the thoughts, feelings, and experiences of those who continue to go through this transitional process. Future interviews would be helpful in gathering as many viewpoints as possible in an effort to understand the true nature and complexity of the environment. 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. Whatever influence my presence had in biasing their responses or how my own personal experience has impacted my interpretations of their views, reflects a level of ethnographic awareness that brings my perceptions of their responses closer to the experience itself. These observations represent primary source insights into what it was like to work within the medicological environment at this time.

4.3 SURVEYS OF RURAL PHYSICIANS[221]

In contrast to the oral history interviews, the survey observational method allows for a much larger sample of rural physicians responding to consistent, specific questions about their perceptions of the EHRs, electronic medical communication, and responses to changing governmental, professional, and socio-economic demands.[222] Surveys also allow subjects to remain anonymous, to perform statistical comparisons between responses, and to look for large-scale trends and probabilities. In oral history, there is the possibility of digging deeper or "piggy backing" on a response when someone says something of interest; but, at the same time, since

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[221] 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 of 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 of 2009 in a paper presentation entitled, "Communicating in a Technical World: Physician-Patient Challenges in Rural America Today."

[222] Due to the nature of this method, no opportunity for follow-up remarks, in-depth conversations, and in-person observations exists with each physician. Although validity is to some degree sacrificed for improved reliability, the use of a second methodology to observe a part of the same population allows for a richer, more diversified observation of how physicians are responding to the medicological environment at this moment in time.

the interview is in person, it tends to be affected by vocal and body language responses communicated by the interviewer (and subject as well). These factors may influence the way a narrator shapes his or her responses. In short, the oral history tends to be more valid, i.e., the interviewer tends to be "measuring what he or she is said to be measuring." The reliability, however, is somewhat sacrificed in that one interview may contain very different questions from the next; and if the interview were repeated, it is not likely that the same information would be obtained twice in a row, especially not if the interviewer were changed. In contrast the survey tends to be more reliable but less valid. The more control placed on the study, the easier it is to repeat it again consistently with a larger number of people. The person administering the survey (if done in person) can be changed as well since all observers are trained to administer the survey in the same exact way. At the sacrifice of control, however, the survey can be less valid in that it is less likely to be measuring what is said to be measuring, i.e., it is less close to the primary data source or the more natural presentation of the phenomenon.

Recognizing these strengths and weaknesses suggests the importance of a multi-methodological approach. Using a second methodology to observe a part of the same population allows for a richer, more diversified observation of how physicians are responding to the medicological environment at this moment in time. When a multi-methodological approach is used, multiple ways of looking at the same phenomenon help to assure that the lack of validity and/or reliability of using one method over the other might be compensated for in using them both.[223]

[223] Of course this "compensation" does not suggest that all aspects of the environment are represented. Rather, multiple observations of varied forms simply allow for a more diversified perspective of the same phenomenon. This does not mean that the environment is represented in total. It merely means that the observational benefits of one observational method in part helps respond to the limitations of the other and vice versa.

This segment uses a standardized survey to examine rural physician response patterns to the EHRs and asks as well about online communication with patients. The objective, again, is mainly to explore what physicians in the rural area of Johnstown, Pennsylvania are thinking and feeling about this new medium as they face the changing medicological environment at the time of the HITECH Act's implementation.

4.3.1 The Landscape

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[224] all had a profound effect on how physicians perceived their personal interactions within this environment at this particular time. The next section goes into greater detail about these factors as context for the survey data that follows.

4.3.1.1 The Climate

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 towards adoption. The overall degree of "favorability" towards technology both in- and outside the healthcare profession is a reasonable item to measure as it may show how well the physicians

[224] It is to be noted that 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. It was independent at the time.

within this environment at the time felt about this change. Perhaps if physicians show favorability towards technology in general, they will be more willing to transition towards EHRs. The focus, therefore is on EHRs and not specifically electronic messaging and emails themselves. Although questions of online interactions with patients remain an underlying, secondary interest, this cannot be the key focus of a study trying to examine the general landscape of the medicological environment at this particular point in time.

If physicians are not in favor of using the medium of EHRs, it is not likely that they will look favorably upon the use of electronic transactions 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. 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 towards the medium helps to measure willingness to welcome the new medium of EHRs and in turn facilitate not only electronic record keeping but online, secured portal messaging as well. Additional questions concerning technology are, however, interspersed throughout the survey not only to prevent physicians from guessing what the researcher was trying to find but also to see if any relationships in particular uses of technology might be surmised.

More specifically the survey examines usage patterns in comparison to *physician perceptions of patient use* of technology, *favorability towards the medium of EHRs*, and *differences between primary care physicians (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. As such, it was more vital to detail their specific experiences than it would be for the larger group of physicians. However, with a survey, these groups can easily and efficiently be questioned about their perceptions and usage patterns all at the same time, allowing for the study of a still broader overall population of physicians.

4.3.1.2 The Hypotheses

In quantitative methodology, it is assumed that relationships identified within environments are noticed during observation. In keeping with the quantitative health survey methodology (Fowler, 2009; Aday & Cornelius, 2006), preliminary questions, relationships, and assumptions are considered to help shape the survey development. Although multiple hypotheses were tested, six in particular having to do with physician favorability with EHRs seemed most compelling.

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 towards EHR adoption) were noticed. The following hypotheses identify the anticipated relationships between variables concerning physician favorability and usage, which the survey sought to test:

> H1: The more favorably physicians feel towards technology in everyday life (outside of the medical profession), the more favorably they will feel towards technology (computers, Internet, PDAs[225], EHRs) within the practice of medicine. (Q-7a,b)[226]

> H2: The more favorably physicians feel towards technology in healthcare, the more often they will use EHRs overall. (Q-8e)

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[225] PDA stands for Personal Data Assistants. This term is not used very frequently any more since the wide acceptance and usage of the Smart Phones, which took over the market since they are capable of doing all that the typical PDAs had done and much more.

[226] For a copy of the actual survey, see Appendix B.

H3: The more favorably physicians rate their usage of technology in non-work related areas, the more often they will use EHRs overall. (Q-9j and Q-8e)

H4: The more favorably physicians rate their patients' usage of technology, the more often they will use EHRs overall. (Q-10n and Q-8e)

H5: The more favorably physicians feel towards EHRs overall, the more favorably they will view the effectiveness of EHRs for quality patient care (Q-14 and Q16-a)

H6: Primary care physicians will be less in favor of EHRs in offices today than will all other specialties. (Q-14 and Q-1d)

4.3.2 The Method

The methods, results, and initial discussion segments herein follow the scientific method of data presentation. The discussion section and concluding remarks at the end of this segment allow for an integration of the applied use of both quantitative and qualitative observational methods.

4.3.2.1 Target Population

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, draws from a region of approximately 22,000 people who are largely serviced by this hospital system. It has provided care to about 25,000 inpatients and 500,000 outpatients (Conemaugh Health Systems, 2014). Although some patients frequent other rural area hospitals such as those in Windber, Indiana, Somerset, and Bedford, most seek their primary healthcare through this hospital system and frequently obtain more sub-specialized care from such cities as Pittsburgh, Baltimore, or 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 have voting privileges at this facility.

4.3.2.2 Survey Development and Distribution

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 a brown or blue interdepartmental envelope with a folded, self-addressed, return interdepartmental envelope inside along with the actual survey booklet. (See Appendix B for a copy of the survey.) 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 is 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. [227]

[227] Of the 393 survey's sent out, at least 56 were returned as undeliverable by the courier service. Dr. Wieczorek's office did not save the returned envelopes, making it impossible to identify who in the group were ineligible. This maintained the anonymity; but it hindered the efficiency of future mailings. Upon checking directly with the courier

(Follow-up letters were sent to the 312 eligible physicians in hopes of improving the response rate, however, no additional responses were returned within the time limits of this study.[228])

4.3.2.2.1 EMR versus EHR

At the time of this survey, it was determined that EMR (Electronic Medical Record) would be used instead of EHR (Electronic Health Record). Although both terms continue to be used interchangeably, at the time the distinction was often made to refer to EMRs as what physicians implemented in their individual office practices and to EHRs as larger-scaled systems used within hospitals and between practices (interoperability). Johnstown physicians did use EHR and EMR interchangeably, but EMR seemed to be more commonly used at the time of the survey distribution. (For consistency here, however, "EHR" will continue to be the acronym of choice.)

Currently the terms tend to mean the same thing: a variation on any electronic record system used within the healthcare arena for the purpose of meeting the HITECH Act's requirements of Meaningful Use. However, some organizations such as the Texas Medical Association, still make a very clear distinction:

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service, it was found that some but not all of the listed physician offices in Somerset, Altoona, and other outlying regions were included in the courier's free service. Other urban physician groups, who serviced the hospital such as those from Children's Hospital of Pittsburgh and the Nighthawk Radiology Services of Indiana state, were also not part of the courier service. Since all members of the population were surveyed, the sample was not randomized and the sample error not calculated for this study.

[228] Follow-up letters were then sent to all 312 physicians since there was no way of determining which individuals actually responded to the survey. Again, the hospital interdepartmental mail was used with a single letter on University of Pittsburgh at Johnstown letterhead placed inside the standard envelope. The choice was to use Pitt-Johnstown letterhead instead of the University of Pittsburgh. The reason for this was that the former is the key educational institution in the region. There is a pre-med, pre-health professional, nursing, and respiratory care program that services the hospital not only with potential employees but with interns. With me teaching there, I felt it was more appropriate and less threatening than using the place where I was going to graduate school. I still taught full time at Pitt-Johnstown while going to graduate school full time in Oakland. That made both places possible choices. I just felt the former was less threatening and more familiar to the local physicians than the latter.

- An electronic medical record, the electronic replacement for paper charts, is the record of patient health information generated by encounters at one particular physician practice. This is the physician's own electronic record of his or her patient's medical care. When you purchase medical records software, you are purchasing an EMR system.
- An electronic health record is a record of a patient's long-term and aggregate health information generated by one or more encounters in any care delivery setting. Stemming from the interoperability of multiple providers, the EHR is distinct from the software systems that directly support caregivers treating patients. Rather, the EHR connects the physicians and other caregivers. Included in this information are patient demographics, progress notes, problems, medications, medical history, immunizations, laboratory data, and radiology reports. (Texas Medical Association, 2014)[229]

For the most part, however, the healthcare industry over the years has paid less and less attention to this distinction with no true consensus. Since, however, at the time of this research it was more common for rural physicians in the Johnstown region to use EMR than EHR, EMR was selected for the questionnaire.

For reporting and consistency purposes throughout this document, however, “EHR” will be used. After all, since this dissertation focus is on the broader medicological environment, the EHR stands as most appropriate. Again, the *questions on the survey* of this particular study contain the acronym EMR only because that was most common at the time of this study and because the perspective was from the individual physician and not the broader, hospital based, or interoperable perspective.

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[229] Note that this is one of the clearest statements found in making this distinction, and yet, the update of this particular site was made in 2010. Today, it is likely that such a statement, though valid, is not of concern to most users. Again, the two terms are used interchangeably for the most part.

4.3.2.2.2 Question Preparation

All questions on the survey were original questions designed to gather data on what variables affected physician decision-making in light of technology and EHR adoption. Questions were derived from a thorough review of literature. Additionally, the previously discussed oral histories conducted between January and February of 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 are members of this rural community of physicians who admit patients to Conemaugh Hospital. For instance in the Gray Medical Practice case study, this group had left an "antiquated" group practice which had no computers and later set up a new independent office with a paperless EHR system. Multiple variables and research questions emerged as possibilities for analysis in this study because of these previous interviews. In effect the questions emerged from observations of the existing literature of the time, from the oral history interview results, and from my own interaction within the medicological environment.

After multiple revisions, the final copy of this paper/pencil survey consisted of thirteen questions using Likert scales with options ranging from four to ten. Many of the questions contained a series of sub questions on related variables. Additionally, one question requested the percentage of patient population for various age groups, one asked for gender, and one asked to check off all forms of technology that the physician personally used. Finally, physicians were welcomed to write comments in the margins and to fill out the last page with additional comments concerning the survey or the topic of technology in medicine in general. This allowed for some level of personalization and open-endedness.

4.3.2.2.3 Pretesting of Questions

The survey was pre tested by three physicians who were not included in the final observation sample and who took between 10 and 15 minutes to complete the survey. This time estimate was indicated in the survey cover letter, requesting their participation. Students in a University of Pittsburgh survey research methods class also reviewed, commented on, and made suggestions as part of the development of the final survey.[230]

4.3.2.3 Data Management and Analysis of Questions

4.3.2.3.1 Analysis Method

The point of this analysis was to explore the possible relationships between perceptions of usage, actual usage, and specialty. All data was entered into the SPSS statistical analysis program; and frequencies, cross tabulations, and chi squared analyses were run. Only relationships between key variables hypothesized at the onset of this study were examined. These variables were the level of favorability physicians felt towards technology in everyday life, their favorability levels towards technology within the practice of medicine/healthcare, their perceptions of effectiveness of EHRs for quality patient care, the overall amount of EHR usage, and the type of physician specialty. Frequencies were run in order to identify any noticeable relationships between the various sub questions and to determine any problems that surfaced through the analysis.

[230] The physicians used to test the time limit of the survey were my husband and two urban primary care physicians who I knew personally. The three were not a part of the final survey results. Likewise, the students who did the survey pre-testing came were my fellow classmates from the Spring 2009 School of Public Health Survey Research Methods class (BCHS 3002) at the University of Pittsburgh. They along with the professor, Donald Musa, DrPH, previewed the survey and provided a wealth of comments and suggestions, all of which were incorporated into the final copy of the published survey.

4.3.2.3.2 Purpose of Question Analysis

The main purpose of this segment of analysis was to determine the effectiveness and validity of the questions as they attempt to shed light on the medicological environment at the given point in time of EHR implementation. Information about rural physician perceptions is of primary interest; but the strength of the conclusions drawn depends upon the quality of the questions. As the medicological environment is explored, a learning curve exists. The implementation of EHRs at the time was relatively new territory to study, and so learning to study it through appropriate question formulation was and is of utmost importance. In the end, the survey provided an opportunity to learn both about physician perceptions and question development for future studies.

4.3.2.3.3 Data Entry Decisions and Error

During data entry, several decisions were made with an effort towards consistency. To begin with, numerous errors were noticed after the survey was distributed. The most important and confusing of these was the miss ordering of numbers going from Q-6 to Q-9 and then to Q-7. In doing the recording and analyses of this data, numbers were renamed in numeric order with Q-9 being named Q-7, Q-7 named as Q-8, and then all subsequent numbers listed from Q-9 and ending in Q-16 instead of Q-15. (Please note that hereafter; all references to question numbers will follow the renamed question number instead of the original number. The corrected survey numbering is located in Appendix B.) To avoid error, each survey was renumbered in red. Additionally to facilitate recording of data, all categories that were not listed numerically were also numbered on each survey in red so that 1=Never, 2=Almost Never, 3= Not Often and so on. (If this survey is revised in future studies, the same reordering and labeling would be done prior to printing of a subsequent version in an effort to improve the data recording process.) Once relabeled in red, these formatting errors did not require any notable decision-making during the data input process.

Another copy error concerned Q-7. The options read, “Moderately against it, Moderately against it, Moderately for it, and Totally for it.” Instead, the first option should have read, “Totally against it.” One physician placed a question mark on the sheet, which brought this to my attention. There is no means for assessing what effect this survey measurement error had on the results since the Likert scale was used throughout the survey with similar (yet appropriately labeled) options elsewhere. Interestingly enough, while most responded with “Moderately for it” or “Totally for it.” The following results indicate the minimal effect this might have had in that only two out of 84 responded to what would have been “Totally against it,” though one would have no way of knowing what these results would have been otherwise. Tables 1 through 3 (Section 4.3.3.1) indicate the modes of central tendency of the responses as well as specific responses to the individual questions. Again, had there been a greater tendency towards the “against” categories, this may have more severely misrepresented the data. Clearly this typographical oversight caused a degree of unnecessary measurement error on a question that was quite relevant to the results of the study. The fact that overall results leaned so heavily towards the favorable category, however, may make this a moot point.

As far as physicians not answering all questions, some were completely skipped and thus were entered as such. One physician eliminated the entire first page. Three omitted question Q-11 for no apparent reason other than perhaps its placement at the bottom of the third page below two, large, multi-part questions. Being one of the more relevant questions for this survey, it was concluded that if supplemental versions would be used for this survey, the question should be placed at the top and not at the bottom of the page to see if it would be less likely to be skipped.

Questions listed as "other" were often not responded to by the physicians and were entered simply as "skip" responses. Rarely did physicians write comments on the "other" category and even when doing so did not provide any consistent response to warrant consideration of additional variables for future analysis.

Anytime there was an apparent pattern of check marks in groups of questions such as in Q-9 which asked, "How often have you *personally* used the following technology for *non-work related purposes*?" the pattern was continued to complete the "other" response instead of marking it as "skipped." For instance, if answers down the column were all indicated as "Often," then the pattern was continued as such. This was done consistently throughout the survey. If, however, there were multiple responses in any one block of questions, the response was not assumed but rather marked as "skipped."

Question Q-10 posed a particular problem for calculations in that it contained an "I don't know" category in response to the sub points in the question, "How *many* of your *patients* do you think use the Internet for any of the following reasons?" Of the 84 responses only 45 or 54% of the physicians answered without using the "I don't know" category for at least one of the sub questions. In an attempt to collapse the question into one unit of analysis to measure overall perception of patients, those who used any "I don't know" responses were eliminated from the analysis. The total response number was calculated for each of the 45 physicians and then compared through cross tabulations with Q-8 e, "How often have you *personally* used electronic medical records?" (See results section below.) The problem with doing this was that the total response number was reduced nearly by half, making the data less reliable and valid. It would have been better not to provide the "I don't know" category since the main purpose of this study was to evaluate how physicians *thought* patients used technology not whether or not they actually knew how many did. Although this was stated in the questions as “do you think,” by allowing an “I don’t know category,” the question implied that physicians either knew or did not know instead of them thinking it was appropriate to guess what they thought patients did (again the whole point of the study). Therefore, if and when this research is repeated, the “I don’t know” category should be eliminated in future drafts of this survey.

Another measurement decision emerged in trying to collapse the data into total calculations for how patients were perceived (Q-10) and how physicians actually used technology (Q-9). The “other” category for both questions created a degree of measurement error in that those physicians who opted not to enter anything in the “other” category received lower total scores than those who did not. (See results section for actual data analysis.) The simplest solution to this would have been not to add an “other” category with options but rather to provide space for an open-ended response, something planned in subsequent versions of this survey.

Finally, when this data was collapsed into single variables of physician use and physician perception of patient use, scales had to be created for each collapsed category. Therefore, for Q-9, upon adding up all of the possible scores in Q-9a through Q-9h, the following scale was used: 8-15= never; 16-21=almost never; 22-28=no often; 20-35=sometimes; 36-41=often; 42-48=very often. For Q-10a through Q-10 l, the scale used was 12-21=none; 22-31=very few; 32-41=some; 42-51=most; 52-60=all. These categories approximated the median range to the closest whole number and appeared best to represent equally weighted categories.

A final problem with Q-10 emerged for two pediatricians who refused to respond to the question due to the fact that their patient population was too young to use a computer. One indicated that all members of the patient population were newborns. This problem was not anticipated and could have been resolved with a rewording that included, “If your patient population is too young to use the computer independently, please indicate to what extent you feel the parents or caretakers of the children use the Internet.” Because there was no way of identifying who skipped these questions other than giving all pediatricians new surveys to fill out, those questions that were not answered were simply listed as “skipped” responses.

Question Q-16 received skip responses from 4 of the 84 (5%) surveyed with 2 of those 4 indicating that they could not respond since they “did not use EMRs.” In all cases this was treated as skipped data. However, upon further analysis of the question, “Please rate the use of EMRs in the practice of medicine in each of the following areas,” the conclusion was drawn that in future survey revisions, this should be followed with, “If you do or do not presently use EMRs, please state how you *think* EMR usage is affected in each of the following areas.”

Finally, after tabulating all the responses and descriptively seeing if there were any differences in types of physicians, it was realized that the categories in Q-1 did not adequately represent the data. That is, each type of primary care physician was listed (family practice, internal medicine, pediatrics, and obstetrics/gynecology) with a general category of “other specialty.” What was found was that about half of the physicians (44/84 or 52%) fell into the non-primary care category. Because of this, the data was reorganized into three categories of 1=all primary care, 2=those who are not primary care but who have offices outside the hospital (surgeons, dermatology, cardiology, etc.), and 3=those who are not primary care but who practice only in the hospital (radiology, emergency medicine, anesthesiology). This regrouping of the data provided more insight into the differences between types of physicians since most research thus far examines either hospitals or primary care physicians; and no one has distinguished between these groups. (Results in Section 4.3.3 for further discussion.)

In short, most decisions for cleaning the data were minor with rare checkmarks outside the boxes and, for the most part, with clear indication of the intention of the respondent. Although somewhat confusing for data input at first, numbering of questions and categories did not seem to be a problem in actual data collection and analysis. Data collapsing issues posed some problems, but were dealt with as consistently as possible. Revisions for future use of this survey indeed must be made keeping each of these measurement errors in mind.

4.3.3 The Results

The most basic question sought in this research study regards, what factors involving physicians' perceptions best contribute to the likelihood of their adopting EHRs? As stated above, many variables were examined throughout the survey with 6 main ones explored: V1: physician favorability towards everyday technology use; V2: physician favorability towards technology in medical practices; V3: how often physicians use EMRs overall; V4: physician ratings of patient use of technology; V5: physician effectiveness ratings of EMRs overall; and V6: physician specialty type.

4.3.3.1 Hypothesis One

The first hypothesis states, "The more favorably physicians feel towards technology in everyday life (outside of the medical profession), the more favorably they will feel towards technology (computers, Internet, PDAs, EHRs) within the practice of medicine. A comparison (Tables 1 through 3 below) between questions Q-7a and Q-7b revealed that physicians were strongly in favor of technology. Although the mode (4/4) indicated total favorability of technology, the mean indicated there were some differences, with a slightly more favorable view of technology outside of medicine (3.69/4.00) than 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 physicians at this point in time are not interested in the use of technology itself. Any resistance towards EHRs may have more to do with EHRs themselves than towards technology overall. Hypothesis one therefore is a moot point since rural physicians were significantly skewed more favorably towards technology whether or not they supported it in medicine.

Table 1. Modes of Central Tendency for Q-7 (out of 4 total)

		overall feelings towards the use of technology WITHIN medical practice	overall feelings towards the use of technology outside the practice of medicine
N	Valid	84	84
	Missing	0	0
Mean		3.476	3.690
Median		4.000	4.000
Mode		4.0	4.0

Table 2. Overall feelings towards the use of technology *WITHIN* the practice of medicine for Q-7a

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	against it	2	2.4	2.4	2.4
	moderately against it	4	4.8	4.8	7.1
	moderately for it	30	35.7	35.7	42.9
	totally for it	48	57.1	57.1	100.0
	Total	84	100.0	100.0	

Table 3. Overall feelings towards the use of technology *WITHIN* the practice of medicine for Q-7a

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	moderately against it	1	1.2	1.2	1.2
	moderately for it	24	28.6	28.6	29.8
	totally for it	59	70.2	70.2	100.0
	Total	84	100.0	100.0	

4.3.3.2 Hypothesis Two

In comparing physician favorability towards technology in medicine and their use of EHRs (Q-7a and Q-8e), it was found that despite the fact that physicians say they overall favor 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 use them all the time. (See Table 4.)

Table 4. Personally used for work EHRs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	36	42.9	42.9	42.9
	almost never	4	4.8	4.8	47.6
	not often	1	1.2	1.2	48.8
	sometimes	5	6.0	6.0	54.8
	often	6	7.1	7.1	61.9
	very often	32	38.1	38.1	100.0
	Total	84	100.0	100.0	

Upon comparing Table 4 and 2 through cross tabulations, a relationship was identified between those who were “totally for “technology and those who used EMRs “very often.” Table 5 reviews this data. 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 are exposed to EHR usage, the more favorably they rank technology, thus reasonably supporting the hypothesis.

Table 5. Cross tabulations of physicians' overall feelings towards the use of technology WITHIN medical practice and how often physicians used EHRs at work.

			personally used for work EHRs						Total
			never	almost never	not often	sometimes	often	very often	
overall feelings towards the use of technology WITHIN medical practice	against it	Count	1	0	0	0	1	0	2
		% within overall feelings towards the use of technology WITHIN medical practice	50.0%	.0%	.0%	.0%	50.0%	.0%	100.0%
		% within personally used for work EHRs	2.8%	.0%	.0%	.0%	16.7%	.0%	2.4%
	moderately against it	Count	3	0	0	0	0	1	4
		% within overall feelings towards the use of technology WITHIN medical practice	75.0%	.0%	.0%	.0%	.0%	25.0%	100.0%
		% within personally used for work EHRs	8.3%	.0%	.0%	.0%	.0%	3.1%	4.8%
	moderately for it	Count	16	3	0	3	2	6	30
		% within overall feelings towards the use of technology WITHIN medical practice	53.3%	10.0%	.0%	10.0%	6.7%	20.0%	100.0%
		% within personally used for work EHRs	44.4%	75.0%	.0%	60.0%	33.3%	18.8%	35.7%
	totally for it	Count	16	1	1	2	3	25	48
		% within overall feelings towards the use of technology WITHIN medical practice	33.3%	2.1%	2.1%	4.2%	6.3%	52.1%	100.0%
		% within personally used for work EHRs	44.4%	25.0%	100.0%	40.0%	50.0%	78.1%	57.1%
Total		Count	36	4	1	5	6	32	84
		% within overall feelings towards the use of technology WITHIN medical practice	42.9%	4.8%	1.2%	6.0%	7.1%	38.1%	100.0%
		% within personally used for work EHRs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

4.3.3.3 Hypothesis Three

In light of how physicians rate their usage of technology in non-work related areas and how often they use EHRs (H3), results are best viewed in Figure 1 and 2 below:

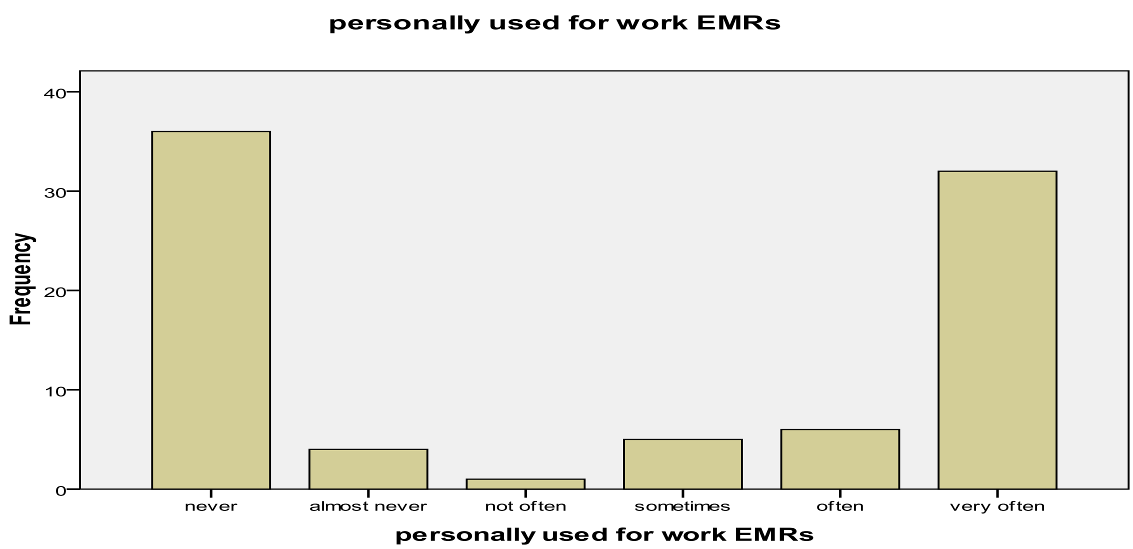

Figure 1. How Often Physicians Use EHRs

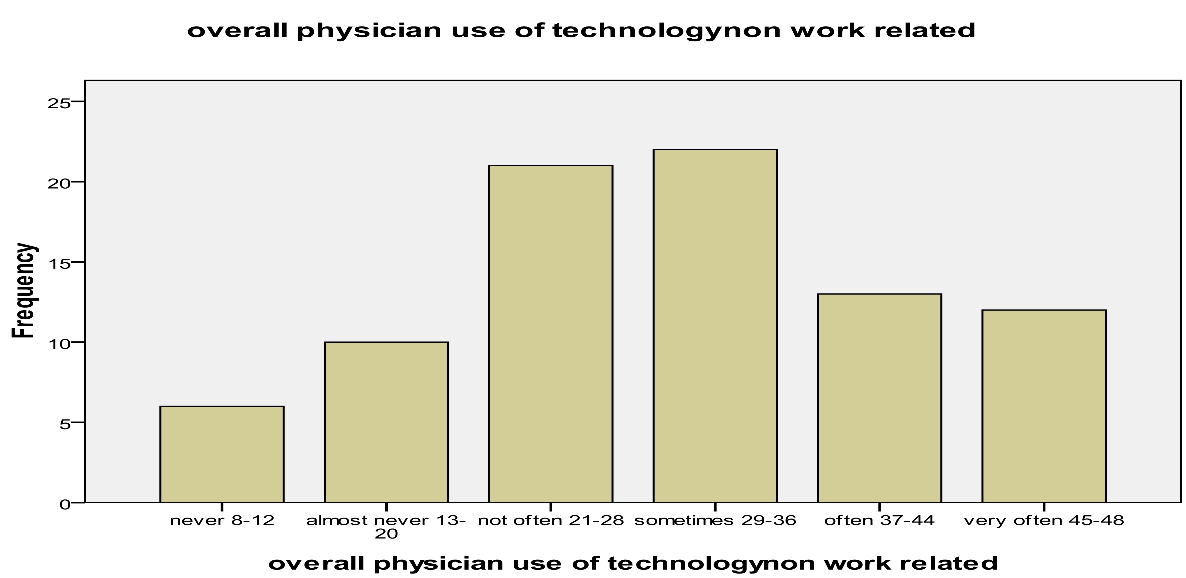

Figure 2. Overall Physician Use of Technology in Non-Work Related Areas

Overall physicians use technology and the Internet for non-work 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 is the use of EHRs which is nearly split between “never” and “very often” indicating that physician either use EHRs or they do not with little part-time usage. In analyzing this information, perhaps a scale is not as revealing in determining EHR usage but rather a simple yes/no analysis. There is no significant relationship between the use of EHRs and the personal use of technology. Therefore Hypothesis 3 is rejected. Rural physicians still overall rate the use of EHRs positively even though some do not use technology at all. Non-work related “often” or “very often” use of technology was at 29.8% as compared to 45.2% of often or very often use of EHRs. This suggests that heavy use of technology and EHRs are related but not sufficiently correlated overall.

Table 6. Overall physician use of technology that is non-work related

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never 8-12	6	7.1	7.1	7.1
	almost never 13-20	10	11.9	11.9	19.0
	not often 21-28	21	25.0	25.0	44.0
	sometimes 29-36	22	26.2	26.2	70.2
	often 37-44	13	15.5	15.5	85.7
	very often 45-48	12	14.3	14.3	100.0
	Total	84	100.0	100.0	

4.3.3.4 Hypothesis Four

Hypothesis four states that the more favorably physicians rate their patients’ usage of technology, the more often they will use EHRs overall (Q-10n and Q-8e). 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 39 times or over 46% of the time, the column was eliminated and only "none," "very few," "some," "most," and "all" were examined. (See procedures section for further comments.) Results showed that of the 45 physicians who chose to comment on patient usage, they generally felt that very "few" or "some" patients used the Internet, with a mean of 2.46 and a median of 2.00 on a 5 point scale.

Table 7. Statistics

N	Valid	45
	Missing	0
Mean		2.4667
Median		2.0000
Mode		2.00

Table 8. How many patients use the Internet according to the physicians' perspective

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	none	1	2.2	2.2	2.2
	very few	23	51.1	51.1	53.3
	some	20	44.4	44.4	97.8
	most	1	2.2	2.2	100.0
	Total	45	100.0	100.0	

Table 8 further shows that only one of the 45 physicians surveyed thought that none of their patients used the Internet and only one of the 45 thought that most used the Internet with 51.1% of physicians thinking that "very few" of their patients used the Internet. In an "age of media," this reveals that rural physicians overall seem to feel that over half of their patient population does 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 hypothesis that there indeed is a correlation between how often rural physicians use EHRs and how they view their patient's use of technology. (See Table 9 for further details.)

Table 9. How often physicians use EHRs with cross tabulations

			How often physicians use EMRs					
			never	almost never	sometimes	often	6.00	Total
How many patients use the Internet according to the physicians' perspective	none	Count	0	0	0	0	1	1
		% within How many patients use the Internet according to the physicians' perspective	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within How often physicians use EHRs	.0%	.0%	.0%	.0%	5.9%	2.2%
	very few	Count	15	2	1	1	4	23
		% within How many patients use the Internet according to the physicians' perspective	65.2%	8.7%	4.3%	4.3%	17.4%	100.0%
		% within How often physicians use EHRs	75.0%	66.7%	33.3%	50.0%	23.5%	51.1%
	some	Count	5	1	2	1	11	20
		% within How many patients use the Internet according to the physicians' perspective	25.0%	5.0%	10.0%	5.0%	55.0%	100.0%
		% within How often physicians use EHRs	25.0%	33.3%	66.7%	50.0%	64.7%	44.4%
	most	Count	0	0	0	0	1	1
		% within How many patients use the Internet according to the physicians' perspective	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within How often physicians use EHRs	.0%	.0%	.0%	.0%	5.9%	2.2%
Total		Count	20	3	3	2	17	45
		% within How many patients use the Internet according to the physicians' perspective	44.4%	6.7%	6.7%	4.4%	37.8%	100.0%
		% within How often physicians use EHRs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

4.3.3.5 Hypothesis Five

Hypothesis 5 states that the more favorably rural physicians feel towards EHRs overall (Q-14), the more favorably they will view the effectiveness of EHRs for quality patient care (Q16-a). To begin with, physicians appear to agree that the use of EHRs does increase patient care. See Figure 3 below which indicates that nearly 87% are moderately or totally for it.

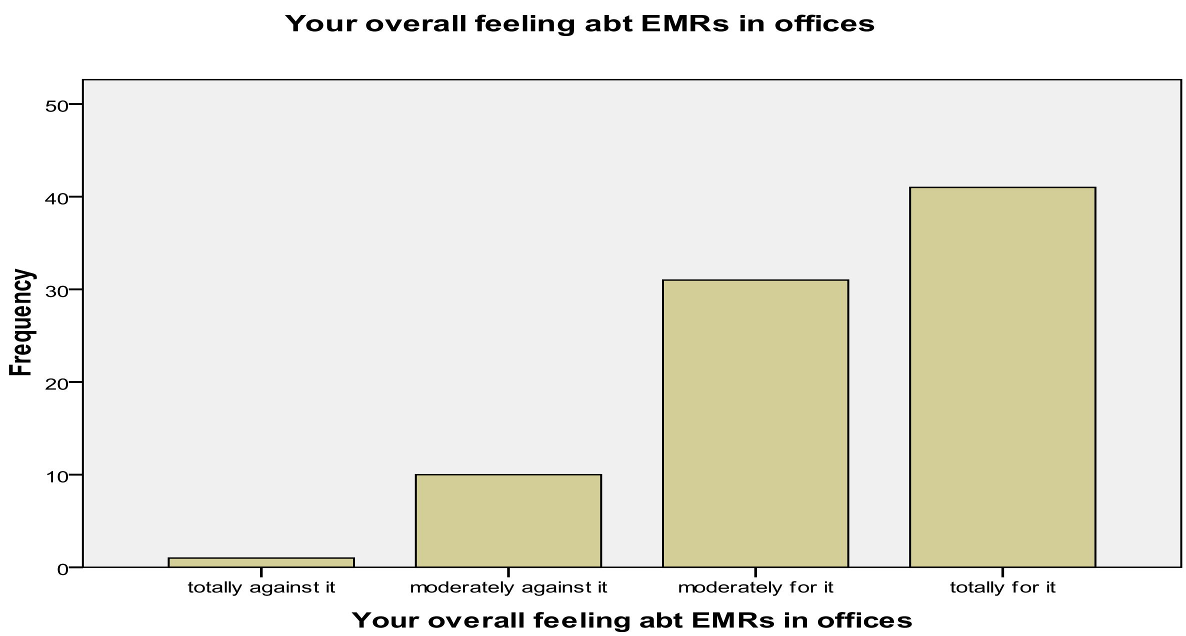

Figure 3. Physician's Overall Feelings about EHR Adoption in Their Private or Hospital Offices

Table 10 further shows that 69% of physicians feel that EHRs increase the quality of patient care while only 31% feel it is decreased. Of that 31%, 21.4% of the physicians gave the rating of 5 out of a possible 10 and only 8.6% gave a rating lower than 5. This shows that rural physicians overall believe that the quality of care is improved by the use of EHRs.

Table 10. Rate EHRs in quality of patient care

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.0	1	1.2	1.2	1.2
	3.0	1	1.2	1.2	2.5
	4.0	5	6.0	6.2	8.6
	5.0	18	21.4	22.2	30.9
	6.0	9	10.7	11.1	42.0
	7.0	13	15.5	16.0	58.0
	8.0	17	20.2	21.0	79.0
	9.0	10	11.9	12.3	91.4
	greatly increases	7	8.3	8.6	100.0
	Total	81	96.4	100.0	
Missing	System	3	3.6		
Total		84	100.0		

As shown in Table 11 below, of the physicians who rated EHRs in quality of patient care with a 6 or higher, none of them were totally against EHRs. All of those who were totally against it gave at least a score of 5 for quality of care with 33.3% of those who were moderately against it giving a score of 4 or below. This shows that physicians perceive patient care as a positive benefit of the EHR whether or not the physicians are for their implementation.

Table 11. Cross tabulations between quality of patient care and physicians' overall feelings about EHRs

			Your overall feeling abt EHRs in offices				
			totally against it	moderately against it	moderately for it	Totally for it	Total
Rate EHRs in quality of pt care	2.0	Count	0	1	0	0	1
		% within Rate EHRs in quality of pt care	.0%	100.0%	.0%	.0%	100.0%
		% within Your overall feeling about EHRs in offices	.0 %	11.1 %	.0%	0%	1.2%
	3.0	Count	0	1	0	0	1
		% within Rate EHRs in quality of pt care	0%	100.0%	.0%	.0%	100.0%
		% within Your overall feeling abt EHRs in offices	.0%	11.1%	.0%	.0%	1.2%

	4.0	Count	0	1	3	1	5
		% within Rate EHRs in quality of pt care	.0%	20.0%	60.0%	20.0%	100.0%
		% within Your overall feeling about EHRs in offices	.0%	11.1%	9.7%	2.5%	6.2%
	5.0	Count	1	4	11	2	18
		% within Rate EHRs in quality of pt care	5.6%	22.2%	61.1%	11.1%	100.0%
		% within Your overall feeling about EHRs in offices	100.0%	44.4%	35.5%	5.0%	22.2%
	6.0	Count	0	2	5	2	9
		% within Rate EHRs in quality of pt care	.0%	22.2%	55.6%	22.2%	100.0%
		% within Your overall feeling about EHRs in offices	.0%	22.2%	16.1%	5.0%	11.1%
	7.0	Count	0	0	5	8	13
		% within Rate EHRs in quality of pt care	.0%	.0%	38.5%	61.5%	100.0%
		% within Your overall feeling about EHRs in offices	.0%	.0%	16.1%	20.0%	16.0%
	8.0	Count	0	0	6	11	17
		% within Rate EHRs in quality of pt care	.0%	.0%	35.3%	64.7%	100.0%
		% within Your overall feeling about EHRs in offices	0%	.0%	19.4%	27.5%	21.0%
	9.0	Count	0	0	1	9	10
		% within Rate EHRs in quality of pt care	.0%	.0%	10.0%	90.0%	100.0%
		% within Your overall feeling about EMRs in offices	.0%	.0%	3.2%	22.5%	12.3%
	greatly increases	Count	0	0	0	7	7
		% within Rate EHRs in quality of pt care	.0%	.0%	.0%	100.0%	100.0%
		% within Your overall feeling about EHRs in offices	.0%	.0%	.0%	17.5%	8.6%
Total		Count	1	9	31	40	81
		% within Rate EHRs in quality of pt care	1.2%	11.1%	38.3%	49.4%	100.0%
		% within Your overall feeling about EHRs in offices	100.0%	100.0%	100.0%	100.0%	100.0%

4.3.3.6 Hypothesis Six

The final hypothesis predicted that primary care physicians (PCPs) would be less in favor of EHRs than would other specialists. As noted in the procedures section above, it was assumed that PCPs would be different from other groups since they are the ones who incur more personal office expense and since the government mandates are beginning with this group. Table 12 shows that when cross tabulated, the groups looked basically the same with no real difference between PCPs and specialists as far as their favorability towards EHRs. The hypothesis was rejected in that both groups looked almost identical.

Table 12. Physicians' overall feeling about EHRs
Two way split Cross tabulation categorizing 1=PCP and 2=all other specialties

		Q1d Two way split		
		1.00 PCP	2.00 non PCP	Total
Your overall feeling about EHRs in offices	totally against it	0	1	1
	moderately against it	5	4	9
	moderately for it	13	18	31
	totally for it	21	20	41
Total		39	43	82

The data was then regrouped into three categories. Since some specialists work only in the hospital (Emergency Room Physicians, Radiologists, and Anesthesiologists) whiles others have 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% of that percentage 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. See Table 13 for the specific breakdowns.

Table 13. Cross tabulations between physicians' overall feeling about EHRs, PCPs, Specialists with outside offices, and Specialists only in-hospital work

			primary care/in and out of hospital/hospital only			
			primary care	in and out of hospital: surgery, cardiology	only hospital: ER, Radiology, Anesthesiology	Total
Your overall feeling about EHRs in offices	totally against it	Count	0	1	0	1
		% within Your overall feeling about EHRs in offices	.0%	100.0%	.0%	100.0%
		% within primary care/in and out of hospital/hospital only	.0%	3.3%	.0%	1.2%
	moderately against it	Count	5	3	1	9
		% within Your overall feeling about EHRs in offices	55.6%	33.3%	11.1%	100.0%
		% within primary care/in and out of hospital/hospital only	12.8%	10.0%	7.7%	11.0%
	moderately for it	Count	13	13	5	31
		% within Your overall feeling about EHRs in offices	41.9%	41.9%	16.1%	100.0%
		% within primary care/in and out of hospital/hospital only	33.3%	43.3%	38.5%	37.8%
	totally for it	Count	21	13	7	41
		% within Your overall feeling about EHRs in offices	51.2%	31.7%	17.1%	100.0%
		% within primary care/in and out of hospital/hospital only	53.8%	43.3%	53.8%	50.0%
Total		Count	39	30	13	82
		% within Your overall feeling about EHRs in offices	47.6%	36.6%	15.9%	100.0%
		% within primary care/in and out of hospital/hospital only	100.0%	100.0%	100.0%	100.0%

A visual way of examining the data is further reflected in Figures 4 and 5. Interestingly enough, although the PCPs overall are the group most in favor of EHRs, when comparing groups 2 and 3, it is found that the specialists who work in and out of the hospital are more like the PCPs than are the specialists who only work in the hospital. This suggests that costs incurred by individual office practitioners may reduce the adoption rate for individual physicians over those associated with larger hospital institutions which bear the costs.

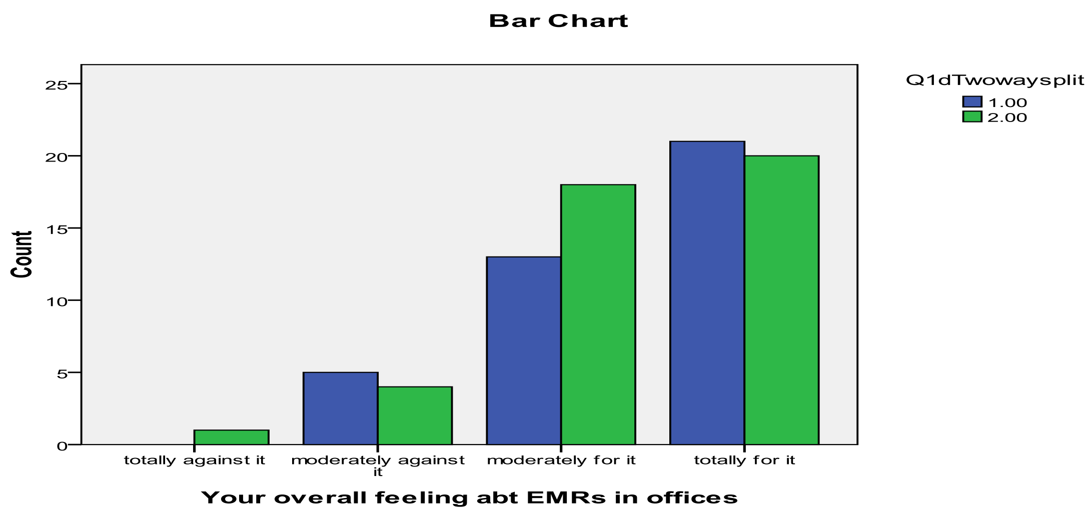

Figure 4. Comparison between PCPs (first bar/blue) and all other physicians (second bar green)

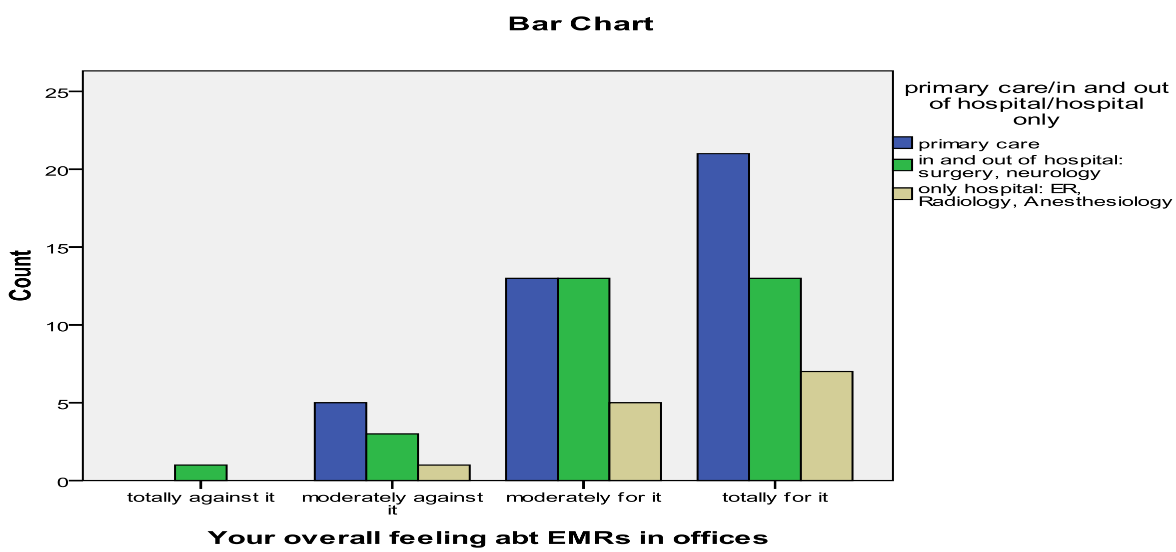

Figure 5. Comparison between PCPs (first bar, blue), Specialist with offices (second bar, green), and Specialists who only work in hospitals (third bar, gray)**.**

Therefore, hypothesis six was also refuted. Overall, PCPs actually appeared to have more interest in and willingness to accept EHRs than all other groups. Assumptions concerning differences within the specialists will be discussed in the following section.

4.3.4 Discussion

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 (and is) of great interest to physicians at a time of significant transition and political change. Surprisingly, even those who wrote comments concerning the limitations of the EHR systems and technology in general still filled out their surveys stating that they were either moderately or totally for EHRs. It appears they have reservations but are now 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 indicate 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 is positive towards 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, additional findings surfaced as well warranting further study and future analyses. Throughout this process, many suggestions for survey improvement surfaced as well. This study and future studies are all part of the process of gaining insight into this complex medicological environment. Therefore the majority of this report focuses on descriptive analyses of the part of the data that is most relevant to the stated hypotheses. This segment of research, like all research, is a partial view of the environment.

The endless uncovering of additional relationships is an important part of the continuing process of exploring the many ways of looking at and learning from the climate at this point in time. It is all part of the history of what forces came into play during this fascinating time in history.

In short, all six hypotheses focused on physicians' favorability towards 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 towards technology within medicine if they were more accepting towards 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 towards 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")[231] is that patients are too old, inexperienced, or technologically challenged ever to want such a change. The argument seems to be used as an excuse for non-adoption as if the patients, not the physicians are holding up technological change within the medicological environment. In reality this may or may not be the case. The point is that the underlying perception existed in these rural physicians' minds. Accurate or not, perception drives action. This finding reveals a dynamic perceptual force within the environment that likely affected physician hesitance against accepting the transition.

Overall, favorability on all levels paralleled EHR usage (H1 through 4). There was found to be a slightly higher favorability towards EHRs if the physicians had already adopted or (to some extent) used EHRs even if usage was only in the hospital. What would have been helpful in drawing more accurate conclusions would be to identify where the physicians used the EHRs. It is possible that many admitting physicians could use some aspect of EHRs in the hospital but not use them at all in their individual practices. This might also affect 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 roll here. Physicians may want 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 indicate.

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[231] This reoccurring theme was implied often in the oral histories and reflects on many comments I heard casually over dinners, on the phone, and at medical conferences that I attended with my husband. Perhaps this is anecdotal, but it is what I witnessed enough to realize that the question of patient perception of technology from the physician's viewpoint was relevant enough for me to ask. I believe it helps to frame how the technology was resisted prior to adoption. It was yet another reason to resist change for change sake, especially when that change was not viewed as coming from patient need but rather government/system mandates.

Finally, hypothesis six 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 towards technology and EHRs in general.

Another more fundamental issue is how the physicians actually define EHR *usage.* As stated in Jha, et al. (2009), there seems to be no clear definition of what is meant by using an EHR in hospital and private office settings. Some may consider EHR usage adequate for simple x-ray and lab reports and some may only be scanning all documents into electronic files (like the Gray practice), while others may be using full EHR capabilities. The question is, how indeed do physicians define EHRs? If their definitions are not all the same, the basis for comparison suffers. Future studies require an examination of which EHR functions are being used by the physician in which setting (office or hospital). The assurance that all physicians agree upon what they are calling EHRs before they actually begin a survey on this topic is vital to creating a valid study. This particular study lacks this level of validity because it is not certain what physicians are actually calling "using" EHRs. Some say they have "already implemented" it but there is no real evidence that they have. Additionally, those in-hospital physicians in this study who say they use EHRs in the emergency rooms are 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 electronic messaging. History is clouded with present perceptions now. The important thing is that what rural physicians thought during this time of transition has been captured to some extent in this rural research study.

Moreover, this research suggests that some of the physicians' concerns about effectiveness of EHRs might be 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 might be helpful in determining on what basis the physicians who have not yet accepted EHRs make their decisions. That is, *where* physicians get their information and how accurate that information is concerning EHRS may likewise have a significant effect on their feelings towards adoption. This study only looks at physician perceptions but does not examine how the physicians have acquired their perceptions. Such information would be helpful in future attempts by the government, insurance companies, and hospitals in mandating physician adoption. Yet again, obtaining this information at this point, might be challenging due to the vast changes that have already occurred within this environment and growth of EHR adoption even in rural areas.

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, with as rapidly as the face of healthcare is changing, 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.

4.4 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 reveals *what physicians think patients think* (and of course what the physicians think as well); but *what patients actually think* may very well be 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).[232]

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[232] Attention to this technique is attributed to Donald B. Egolf, PhD, who helped oversee this particular research study and who himself worked directly with Flanagan as a student and scholar. This work was also part of the Arts and Sciences Research Grant mention above from the summer of 2009.

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

It is important to note that at the time of this study, I sought information on electronic messaging because I believed strongly that EHRs provide 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 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.

4.4.1 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

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 first-hand 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.

different Introduction to Psychology classes were given the survey.[233] Students were likely between the ages of 17 and 20 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.[234]

4.4.2 Design and Distribution of Surveys

The Critical Incident Technique (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 allows for primary evidence from users indicating what worked and what did not when it came to online medical communication. The method outlined here provides the specifics of

[233] Although the major was not identified, it is important to note that Pitt-Johnstown considers the Introduction to Psychology class as a "General Education Knowledge" course in the category of Natural Science. Based upon my experience in advising and participation on the General Education Advisory Committee, I am aware that most students in their freshmen and sophomore years tend to take this class.

[234] 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.

this methodology as it strictly adhered to the CIT technique. (See Appendix C for CIT survey information.)

To begin with, all surveys were labeled at the top of the pate as "Doctor-Patient Electronic Communication"[235] 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.[236] 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

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[235] At the time, the recommendation to use "doctor" and not "physician" came from Dr. Donald Egolf, who at the time had directed my research efforts. His belief was that the term "doctor" was more casual and personal and more commonly used by people in reference to the medical profession. I do not use this term in my preceding comments nor subsequent research because I believe that the term "doctor" can be a confusing one since there are so many different types of "doctors," especially in academia. This is why I only use this term in this section. Some subsequent interviews as well as surveys also used the term "doctor" for the same reason that Dr. Egolf suggested. This term, however, is used sparingly throughout the written portion of this document.

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

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.[237]

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 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,

[237] 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 actually 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 shown below. Either it was due to their age or their personal interest in the study, but few students supplied any "imaginative" examples.

Twitter, Patient Portal), which medical specialty best described the physician involved (Family Practice, Pediatrics, Obstetrics/Gynecology, Surgery, Psychiatry) and what area the student normally resided (rural, suburban, urban).[238]

4.4.3 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 first-hand 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, however, 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

[238] The question on their residence was assed because many students who attend Pitt-Johnstown are actually from urban areas. This information, however, did not end up being very informative since no students really used electronic medical messaging with their physicians.

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 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).

4.4.4 Discussion

Although this Critical Incident Technique study resulted in no primary incidents, two important findings were made. First of all, 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 understood 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 are not clear, concise, and appropriate. The incidents students noted reflect typical problems about any email exchange and fundamental assumptions about the occupation of being a physician. Student responses are as justified as the ones physicians articulated. These were and are legitimate concerns of the very nature of online communication, let alone communication in the specialized field of medicine. Physicians *should* be cautious as they move forward using a new medium. This does not mean that it will fail miserably but that it will have to be approached thoughtfully in an effort to best implement it within the restraints and demands of the evolving medicological environment.

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 indicates that the medium was still very new in that rural area in particular. The email as a medium was not new; but emails within the secured portals of the EHRs were. This further justifies why studying the introduction of this medium in rural America at the particular time of the HITECH Act's implementation is so relevant. It is the perfect time to capture the atmosphere of change within the medicological environment.

Possibly the CIT study would result 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 ask 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!" To some extent, I still get that response in 2015, but much less often. More and more I have noticed even in Johnstown that students state 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). The implementation process has begun. Change is at hand.

4.5 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 use of a multi-methodological approach in examining this space provides insight into the range of simultaneous forces that have affected how physicians and patients navigated through this medicological environment in an effort to give and receive necessary healthcare. Each method of observation adds 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, to the glimpse at student patients through the CIT surveys, each perspective adds 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 has been examined—not by any means. However, each piece and each methodology used has led to a greater understanding of this complex, dynamic medicological environment. To capture an entire environment with all its intricacies, influences, layers, and responses, one would need a lifetime and still not identify all involved in the system of the medicological environment. This was a period of massive change and inherent resistance. Many factors contribute to the transition, but change itself is inevitable. It is what propels life forward into new space and new enthusiasm (and yes fear) of 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 lazar 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 affect the dynamic transition to EHRs and electronic communication between physicians and patients.

5.0 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. In contrast, the urban areas not only adopted earlier but had the means to adopt[239] 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

[239] The "means" includes but is not limited to the existing broadband accessibility, the already existing infrastructure of technology, and the financial backing of much larger institutions.

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.[240]

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. Similar to 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

[240] 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.

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 will necessarily be the same experience that rural users will have once they have 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 will be exhibited by rural responders in the future. Then again, the two adoption processes might be very different because the location, time, situation, and accumulated experiences will be different. The outcome remains to be seen.

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.

5.1 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.

5.1.1 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 taken as representations of the separate categories of rural and urban. That is, are the two populations represented within these studies *different enough* to justify their uniqueness or separateness? The United States 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. The U.S. Census Bureau identifies 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 are considered to be rural (U.S. Census Bureau, 2010).[241]

Based upon this definition, Pittsburgh with a population of 305, 841 and Johnstown with only 20,402 (U.S. Census Bureau, 2015) clearly delineates the two in size as urban and rural respectively. What is more interesting is to see how the two fair in their growth and sustainability, i.e., how they have maintained their size over time. Pittsburgh approaches a 1% growth rate while Johnstown is at -2.7% as of the 2013 reported estimates. That is, the difference in size between the two is expanding. Even more telling is that Johnstown is on record as one of the top seven fastest *shrinking* "cities" in the country with some reporting as of March 2015 that Johnstown is the second fastest shrinking city in the entire country (Frohlich, 2015) with a population growth between 2010 and 2014 of only 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 13 years (Christie, 2013). Certainly both now and during the time of the HITECH Act of 2009, Johnstown sets itself apart as rural compared to the city of Pittsburgh.

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[241] This method of defining is an 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.

Those living in Johnstown range from the elderly members of the community who recall what the region was like when it held urban status some 70-80 years ago to those others who see Johnstown as a rural region in significant decline in size, job availability, and housing value (U.S. Census Bureau, 2010).[242] Being in a rural area also affects transportation factors that are directly related to travel and shipping costs. Lack of technologies such as broadband services often leads to a depressed financial situation that is more challenging in a smaller area where resources and options are not as prevalent as they might be in urban regions. Because of this, the expectations of those in this region may not be as positive about new technologies due to their significant costs, and this region would not likely 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 are 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 will necessarily be achieved soon or in the same way in the rural region of Johnstown. This may happen; but then again it

[242] Johnstown has drawn 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 U.S., over 85% of them are found in the nonmetropolitan areas (United States Department of Agriculture Economic Research Service, 2015). This supports the notion that Johnstown represents a small rural city relatively typical of those found across other regions of the U.S.

may not. To keep this in mind is to be realistic about how the systemic changes evolve throughout the medicological environment not just though the influence of the medium but through the multifaceted influence of regional population growth and change. Again, this is a system, and all working parts affect the relationships and responses within that system.

5.1.2 The Insurance "Coverage Gap"

The previous discussion of the transition towards managed care (Health Maintenance Organizations or HMOs) acceptance in healthcare (Chapter 4), noted the cumulative influence of insurance company requirements and governmental impact on the state of affairs during today's EHR adoption. The *memory* of this adoption affects the perceptions of those responding to the current state of affairs today. It is possible to conclude that the challenges of HMO adoption have affected how healthcare professionals and patients have communicated and behaved within the current medicological environment.

Indeed an additional concern, an unexpected pitfall, exists currently in dealing with healthcare insurance. It is known as the "coverage gap." Fears surrounding this gap have become exacerbated by new insurance coverage patterns that have emerged as a result of the Affordable Care Act. When combined with aspects of rural and urban population factors, the gap becomes a serious problem of concern not only to the physicians within the medicological environment but to the patients as well.

5.1.2.1 Rural Shortages

To begin with, the "gap" in healthcare treatment affects rural populations much more heavily than urban ones; and, in doing so, a rippling effect yet again is felt throughout these regions.

Due to locational factors alone, rural America provides limited access to healthcare. This stems from two factors: Many Americans historically have not been insured with health coverage, and professionals tend to gravitate towards affluent urban and suburban areas. According to Rosenblatt and Hart (2000), a constant physician shortage exists in rural areas of the U.S. 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 is 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 gravitate towards urban areas because the need for such specialties is greater per capita in dense urban regions. This means that for rural area patients to obtain medical care (especially specialized care), they must seek it from urban areas. This likewise means that the population composition of "urban" patients is inadvertently overlapped with a number of rural patients. Any research done on urban populations by default must recognize that rural members may be represented within the population sample.[243] 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 suffer the impact of fewer physicians and, in turn, smaller hospitals, and less up-to-date technological offerings. One impacts the other. Even more so, the effect of managed care *continues* to bare its effect on the rural health system in that HMOs are directly affected by the rural "gap" of insurance and

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[243] It is to be noted that despite the logic in this argument, the fact is that research done on rural hospitals today rarely if ever test out for "rural" population inclusion in the study. Part of this might be an oversight, and part of this might be practicality. It is not only difficult to test out for "rural" but not all members of rural populations actually call themselves 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. When, for example, I lived in Meyersdale, Pennsylvania, Pittsburgh was considered the big city; but going to Johnstown was still considered going to the city. Again, the labels are relative and affected by the users' personal experience and perceptions.

provider availability. Even as late as 2000, many remained concerned that the private managed care systems, which dominate the urban areas through large metropolitan healthcare systems, would be reluctant to provide care to the uninsured. As a result, rural patients would not be able to go to the available physicians even in urban areas because their insurance (or lack thereof) would not be accepted by the HMO of the urban area. This at least has been and continues to be the underlying fear of the managed care HMO plans (Rosenblatt & Hart, 2000). The working poor fall into the gap of having neither Medicaid nor regular health insurance. This is the "memory" of the physicians in the late 1990's; and this is the memory that continues to linger for patients who struggle to gain health insurance today.

5.1.2.2 The Affordable Care Act "Gap"

The government answer to the woes of managed care was to be The Affordable Care Act of March 23, 2010. As earlier discussed, uninsured or underinsured Americans were to gain access to healthcare by going to the government website (health.gov) and applying for coverage. The problem soon emerged that multiple and perhaps unanticipated "gaps" existed for many who sought coverage. For some this gap was a "short coverage gap exemption," which means 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 refers to a place where low income people whose annual earnings fall 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 has not yet happened. According to a Kaiser Family Foundation analysis (Garfield, Stephens, & Rouhani, 2015), roughly four million people across the United States fall 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 affects rural populations more so than urban ones because the former have different demographics, health needs, and insurance coverage profiles. Specifically, nearly two-thirds of the uninsured rural population inhabit states that have not implemented Medicaid expansion. Of the 47.3 million uninsured people, 7.3 million are from rural areas with 65% of these living in non-expansion states while of the 40 million uninsured urban patients only 50% are living in non-expansion states. This reflects a disproportionate number of rural patients who fall through the gap giving them fewer Affordable Care options than their urban counterparts (Newkirk, 2014). In short those who live in rural areas not only face transportation barriers forcing them to travel from rural to urban areas, but they also have 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 is government imposed and, according to the Kaiser Foundation data, imposed in a disproportionately harsher manner against the rural population. It is clear that 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 seems to be almost irrelevant if the availability of funds are 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 is financially unattainable for rural residents. This yet again puts any research about urban usage and difference into perspective.

5.1.3 Broadband as an Equalizing Factor

Finally, as stated in previous chapters, the issue of broadband availability also sets rural and urban communities apart. If rural users have no ability to access advanced technology, what good does it do for urban areas to provide the technology to those rural patients who travel to urban areas for their care? This is a valid question—especially in light of 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 the EHRs through HealthTrak. 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 the EHR technology within the secured portals is negligible. That, however, is not always the case.

According to the National Telecommunications and Information Administration (NTIA) (2013), when the speed of the broadband service is taken into consideration, the disparities between urban and rural areas increase as the speed increases; and, of course, the speed increases when users live the closest to high density populations. Speed really does affect usage and in turn the likelihood of satisfied users of the EHR online communication technology. However, according to the NTIA (2013), discrepancies also exist within urban areas as well with suburbs having higher percentages of residents with higher-speed download capabilities than do 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.

5.1.4 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 will show, the results must carefully consider the fact that some of the users might physically be from rural areas, some of the urban population might be left out simply because it falls under the “coverage gap,” and some of the users even within the urban population may have varying degrees of Internet speed and/or access. All of these factors are intertwined in the population of “urban” and this must be considered even before the actual numbers or results below presented are viewed.

5.2 SURVEYS OF URBAN PHYSICIANS AND PATIENTS

In exploring the medicological environment from the perspective of those who have 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 within this entire exploratory project in order to cover larger conclusions about the medicological environment in urban medicine around the time of the HITECH Act’s mandates. Again it is important to note that although the mandates affect 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. To provide the parameters of this study, it is first helpful to review the full scope, functionality, and history of the healthcare online system examined in this study. Information on the population sample, survey content, and survey distribution will follow.

5.2.1 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.[244] 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 with over 55,000 employees (including over 3,000 physicians); more than 20 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).

[244] 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.

5.2.2 The UPMC HealthTrak System: A Timeline

Unique to UPMC was its "HealthTrak" [245] 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

[245] 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) Electronic Health Record system. In the fall of 2013, the portal was rebranded as MyUPMC with the homepage 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 select an option such as "send a message to your doctor," they are launched into a section of MyChart (a "tile" or self-contained sub-program that can be launched independently from the UPMC homepage) that maintains all the original functionality of that section of MyChart. Each time they leave one of these internal links, they go back to the UPMC homepage and then can launch into another "tile" of MyChart. It is to be noted that UPMC uses a variety of EHRs including Cerner and Varian. Dr. Fischer 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 change over time.

Likewise, as of April 2015, in a newly added feature, MyUPMC shows results from tests performed prior to the date patients register for MyUPMC. Another new feature announced on the website is an email notification update stating as follows: "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 may 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 are occurring indicate that patients complained that they were getting too many emails and too much communication with their use of the health portal. This interestingly demonstrates one potential problem with too much email for both patients and physicians.

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.

It is important to emphasize that 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 Dr. 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. The EHRs were already in place and online communication within secured portals between physicians and patients were actively being used.

5.2.3 Overall System and User Description

At the time of this study, UPMC's EHR system was one 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"[246] was the ambulatory care software package for patient Electronic Health Records (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 18 years of age or older who had Internet access and were comfortable with using this system.[247] 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 who 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).[248]

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[246] As noted earlier, "Epic" is a brand name of an EHR vendor that only very large systems can have access to. Epic is the vendor that Conemaugh Health System has recently acquired access to with the selling of Conemaugh to Duke LifePoint, a much larger system more comparable to the city system of UPMC. For a more detailed explanation of Epic's capability, see the following link: https://www.epic.com/software-phr.php.

[247] Although not an integral part of this study, it is to be noted that eVisits require a fee if the medical need is resolved within the electronic message. All Medical Advice entries, which exclusively are used in this research study, are responded to free of charge.

[248] It is to be noted that Dr. Gary 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 has diminished, he continued to be involved in decision-making on HealthTrak as a member of

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 who 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

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its steering committee. The significance of this is that his hands-on, in-depth, on-going experience with this system provided insight into the interpretation and understanding of the results of this study

UPMC, these anticipatory moves towards 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.

5.2.4 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. (See Appendix D for a sample of HealthTrak screenshots representative of those which existed during the time of this study.)[249]

5.2.4.1 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."

[249] 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 screenshots that are included in Appendix D are representative of the content that remained constant throughout the timeframe of this study. The system continues to change.

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 10 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.

5.2.4.2 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.[250] 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 free style with up to 5,000 characters per eVisit.[251] 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.

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[250] UPMC, Aetna, and Cigna insurance companies at the time of this study agreed to reimburse for such visits. More and more companies recognize online visits as worthy of reimbursement and therefore have pre-established fee guidelines in place. This is even more so the case today than it was at that point in the medicological environment.

[251] 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 since most of their condition was already outlined through the guided question/answer system.

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 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' on-going 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 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.

5.2.4.3 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.

5.2.4.3.1 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:

- Non-urgent 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 choose 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 5000 character limit was put in place. From 2008 on, however, a restriction of 1000 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 23 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.[252]

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 amongst HealthTrak users even by the end of

[252] 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.

this research project. For the most part, patients sent only one message at a time and did so well within the character limit allotted.[253]

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

[253] 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).

messages were considered to be true requests for medical advice, they were then forwarded to the requested physician.[254]

These details all had an effect on 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.

5.2.4.3.2 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 on-line

[254] In short, there are two main reasons for 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 non-emergency 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 patient while still being housed within the secured portal of HealthTrak.

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 24 to 48 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 in-baskets 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 choose. 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 choose 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, on-going, 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 choose to access messages from the incoming pool of electronic messages or when physicians choose to respond to an ongoing message thread that was exchanged exclusively between the physician and patient.[255]

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 48 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.

[255] 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.*

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 48-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.[256]

5.2.4.3.3 Transaction Features of Medical Advice

From a legal standpoint, this GIGO example shows that physicians and all who respond to patient messages (no matter what system is used) are expected to do so directly from their own screen name and not through another person's screen name. A physician should never allow a nurse to respond to an electronic message from a patient in a manner that suggests it is coming from the physician directly. Although this misrepresentation is always possible for anyone who uses electronic messaging it is strongly discouraged in this setting since all users must be healthcare employees who themselves have their own email address from which to respond. However, if for any reason a physician does respond by using another person's user name, this is

[256] It is difficult to assess how well such a message delay would hold up in the court of law, especially if the hospital was in the midst of initiating a new system. Some may argue 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 to be seen if ignoring a message may someday be considered patient "neglect" in a court of law. The computer systems do not erase the messages. Human error, however, is just as possible over a phone as it is through an email.

to be clearly noted in the message itself. This is a quality assurance issue which facilitates patient privacy and upholds HIPAA regulations.[257]

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 in particular, 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 Health Insurance and Patient Accountability Act (HIPAA) regulations of 1996 but also by new regulations specified by the Patient Safety and Quality Improvement Act of 2005 (PSQIA) that was published in the Federal Register on November 21, 2008 and made effective January 2009 (Department of Health and Human Services, 2008).[258] 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

[257] 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 confidentially 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.
[258] See http://www.gpo.gov/fdsys/pkg/FR-2008-11-21/pdf/E8-27475.pdf.

largely perhaps because it may be automatically assumed that people identify themselves when they write a message.[259] 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 wellbeing 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 17 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 18 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

[259] 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.

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, i.e., 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.

5.2.5 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 age 18 or older. Those enrolled as legal proxies for patients who were under 18 years of age or who were in need of communication assistance were also included in this sample; but no distinctions were made between proxies and patient users.[260] Since GIMO was an Internal Medicine clinic mostly treating adult patients, few if any proxies represented those under 18. All users were registered HealthTrak participants with their own identification number, usernames, and passwords. No connection was made between

[260] Since patients were not identified, it was not possible to make this distinction.

these identifiers, names, or private health information (PHI) of individual patients. This was in compliance with HIPAA regulations, University of Pittsburgh Institutional Review Board (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.

5.2.5.1 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.[261]

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).

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[261] 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.

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 of all, 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 PACT (Pittsburgh AIDS Center for Treatment) visits were eliminated from the total.[262] 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 (24,487 total HealthTrak users divided by 3,212 total Medical Advice users).[263] Again, for the purpose of this survey, only those who were active in the system could be included in the total population of users.[264]

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[262] Also, PACT is not a part of GIMO and is considered a separate department and clinic. Likewise, the confidentiality issues of PACT would preclude any use of this data.

[263] For discussion of response rate calculations, see Section 5.2.8.1.

[264] 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.

5.2.5.2 Physician Population

A total of 73 physicians were involved in this survey study with 40 being listed as Internal Medicine practicing physicians employed by UPMC and 33 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 40 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 40 who took this survey. Finally, 12 additional physicians participated in the actual online Medical Advice messages (making a total of 52 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 33 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.

5.2.6 Survey Development and Distribution[265]

Both the patient and physician surveys were similar in basic content, design, and distribution. Parallel questions were created in an effort 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 verses 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 December 14, 2010 followed by the first reminder on Dec 29 and second reminder on Jan. 12, 2011. Physicians received the initial survey on December 22, followed by the first reminder on Jan 6 and second reminder on Jan 20. Prior to each distribution of surveys to physicians, a personal request was additionally made at a faculty staff meeting which averages 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).

[265] For all materials associated with the distribution of surveys, see Appendix D.

5.2.6.1 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.

5.2.6.1.1 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?” (#15 of survey, Appendix D). 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 lead 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. (See Appendix D for actual copy of survey.)

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.

5.2.6.1.2 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 Institutional Review Board (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 electronic health records. Since this project was approved by the QI committee process rather than the IRB, it met all necessary CARe standards for approval.[266]

The project itself was titled "Patient Satisfaction with UPMC HelathTrak in General Internal Medicine" and was sponsored and monitored by Gary Fischer, MD, the medical director of the outpatient General Internal Medicine clinic at Montefiore University Hospital (MUH, a UPMC entity). Dr. Fischer was and is in a position that would allow him to make changes based upon the outcome of this study.[267] 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.

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[266] According to http://www.ctsi.pitt.edu/erecord.shtml, the website for the Clinical and Translational Science Institute, CARe provides information and advises investigators about eRecord research registries and recruitment alerts. It also assists with the preparation of research data, letters of support, and budget justification language related to the eRecords. If necessary CARe also provides 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.
[267] It was noted that these outcomes would also be part of this doctoral research.

- 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 during the course of 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 HT 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 electronic medical record 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.

5.2.6.1.3 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 15 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. (As added confirmation of this process, I never saw a single name or patient identifier associated with this survey.) Patients were asked to click on the SurveyMonkey link or to copy/paste it into their web browser. The letter was signed by Dr. Gary 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 Dr. Fischer. First and second reminder letters were sent to improve patient response.[268]

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[268] 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 similar to the previous letter and again asked that a response be made within two days if one had not already been sent.

5.2.6.2 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.

5.2.6.2.1 Physician Survey Design

This survey was developed to see whether or not 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 40 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 33 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 10 available residents who were working at the clinic at the time. A formal email letter sent by Dr. Gary Fischer, with whom all GIMO residents were familiar, stated that a doctoral student in Communication was conducting a survey with the GIMO physicians in an effort to acquire information about their use and perceptions of HealthTrak messaging.[269]

Some residents did comment about the survey design in email form directly back to Dr. Fischer. (Sample responses are shown in Appendix D under "Physician Pilot Recommendations.") One respondent noted that the survey took only about 9 minutes to

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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.

[269] It was stated that the survey should take only about 10 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.

complete, which was within the expected 10-minute estimated timeframe. 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 6-point Likert scale was asked. Dr. Gary 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, 2nd electronic and third telephone. I do understand this is the limit of survey monkey."[270] 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 lead 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 in section 5.2.6.2.2) 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'

[270] This indeed was a limitation of the SurveyMonkey program. This was an excellent suggestion and could be considered in future design studies.

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 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 of 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"[271] 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.

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[271] 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.

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.

5.2.6.2.2 Physician Survey Approval

There were two reasons as to why this study sought approval through the Institutional Review Board (IRB) of the University of Pittsburgh (currently OSIRIS) and not just through the Quality Improvement 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). With this in mind, 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 Gary Fischer, MD as the primary investigator with me named as the secondary investigator. The reason for this was because of Dr. 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 18-years-of-age, 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 through the use of 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.

5.2.6.2.3 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 Dr. 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.[272] (See Appendix D for copies of all letters.)

[272] 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

5.2.7 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 of time and was collected and analyzed to determine how efficacious each user felt the medium was for communication about health. Analysis of the acquired data through the use of SPSS and basic statistical testing follows.

5.2.8 Overview of Survey Results

Results of this set of surveys provide 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.

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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 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 15 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, "Gray Fischer, MD."

5.2.8.1 Specific Patient Population and Response Rate

As stated in Section 5.2.5.1 above, of the 24,487 patients who had had at least one medical encounter with UPMC Montefiore Hospital's General Internal Medicine Oakland Clinic (GIMO) 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 3212 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.

5.2.8.1.1 Patient Demographics

Respondents' demographic characteristics are displayed in Table Q10 in Appendix D. Nearly 93% of the population was age 30 or higher, including 27% age 30-49, 43.4% age 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 (Table Q11). This may also reflect the larger overall female population within this age range. Likewise, in Table Q13 it is shown that high-speed Internet or broadband is 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 interact online at high-speed suggests a reasonably savvy user population.

5.2.8.1.2 Perception of Efficacy of Electronic Messages for Patients

In an effort 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 14 questions and collapsed sub-questions. Using a standardized regression, results showed that 6 Independent Variables were identified in step-wise 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. (See Appendix D.)

The transformed results identified 8 Independent Variables in step-wise progression from highest to lowest predictability of efficacy (with Beta scores listed 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-question 10-13 mean (.071). The first six question sets were found to be significant beyond the .01 level of significance with only Q6, 1-9 mean and Q6, 10-13 mean significant beyond the .05 level of significance. Since an even number of choices were given for most questions, the patients responding were forced to lean towards either favorable or not favorable. That is, they could not simply remain neutral or undecided. The 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 show 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 .287 and a significance level beyond .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.[273]

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[273] See discussion section for further comment on the implications of the term "importance."

Additional results showed that how promptly physicians responded to their patients' online messages (Q4) was associated with whether or not 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 48 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 48-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 .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 particular 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 quiet 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 in light of 13 different circumstances or "reasons." If patients never used electronic messages in a particular situation, they were asked to answer the question in light of how effective they "think" the situation might be when using electronic messages. For measurement purposes, Q6 was subdivided into sections with the first 9 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, non-emergency 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 .003 level of significance) than the emotional/relational set (Beta = .071 at a .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 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.[274]

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

[274] I believe that once electronic messaging becomes a more accepted form of communication between physicians and patients, online communication will afford more in-depth conversation over a longer period of time. Evidence of this is the rise of the use of online interactions in the field of psychiatry. Also supportive of this is the idea of Narrative Medicine applied to electronic messaging.

messaging) (Q7); *usefulness for practical medical issues* (Q6, 1-9 mean); and *usefulness in sharing emotional and relational health concerns* (Q6, 10-13mean).

5.2.8.2 Specific Physician Population and Response Rate

Although an average total of 73 physicians see patients at the GIMO Clinic, 40 are practicing Internal Medicine physicians and faculty while the remaining 33 are resident physicians or interns who rotate 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 30/40 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 24 (60%) of the practicing physicians, the on-line 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.

5.2.8.2.1 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 24 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.

5.2.8.2.2 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 towards the medium with some limitations noted.[275] Although the sample size of physician respondents is relatively small, 26 out of the 30 who did respond filled out one or more of the open-ended questions.

For Question 21, all 26 out of 30 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 14 who responded, 5 (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 (8); the absence of nonverbal feedback (4); the inappropriate medical use of

[275] Although it was assumed that physicians would follow HIPAA laws, it was reinforcing to remind them not to identify anyone in their response.

the medium such as in an emergency or complicated situation (4); the additional time burden placed on the physician (4); the limited access to the elderly and other populations (3); and a frustration that the space given to patients to respond was either too large (1) or not large enough (2). 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 25/30 or 83% responded with favorable comments to this question. The most frequent comment made was that electronic messages were convenient (15) 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 (4), 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 (4), it is easy to use (3), it is cost effective (2), and it allows for documentation for the medical records (1).

The responses to Question 23, which asked about a specific outstanding case of using electronic messages with patients, were varied. In addition to the 5 negative responses noted above, 4 simply responded with a “no” and the other 5 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 that "…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 both in the qualitative and quantitative survey responses.

5.2.8.3 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.

5.2.8.3.1 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 ages of 30 and 49 and 20% between the ages of 50 and 64. The surveyed patients were notably older, with 22.4% over the age of 65, 43.4% ages 50-64, 27% ages 30-49, and only 7.2% ages 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 almost 77.7% of physicians had practiced for over 10 years while physicians agreed 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 0 and 8 (33.3%), 9-16 (33.3%), and 17-32 (30%) hours per week. Only 3.3% of the physician population saw outpatients over 33 hours per week, suggesting again a more academic, urban practice base. Finally, 70% of physicians claimed they had used electronic messages with their patients for under 5 years while only 30% had done so between 5 and 9 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.

5.2.8.3.2 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.

5.2.8.3.3 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 30 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% (45 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 despite the fact that 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 48 hours promised by HealthTrak. However, a total of 88 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 they responded within the required period of 48 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 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.

5.2.8.3.4 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 48 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 48 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 1000 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, non-emergency 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%).

In particular, refilling a prescription was regarded as the most effective use of electronic messaging. Seeking new, non-emergency 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, in light of reasons for use of electronic messaging, this suggests a negative relationship between complexity of problem and perception of efficacy.

5.2.8.3.5 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 twelve or more percent 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% so for addressing embarrassing medical or emotional issues, and 44.3% 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. (See Tables in Appendix D for a visual display of these differences.)

5.2.8.3.6 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%).[276] 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 re-read the information for improved understanding and memory. Physicians may find it easier to communicate more complicated information orally than in writing.

Physicians and patients were in agreement 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

[276] Although "value for your money" and "cost effectiveness" were considered to be the same thing, the latter phrase seemed to fit better from a physicians' business perspective and the former phrase from a consumer-oriented perspective.

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 have to 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 4 out of the 9 categories while face-to-face was also considered most effective in 4 out of 9 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 messaging.

5.2.8.3.7 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 choose 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%) actually 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 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.

5.2.8.3.8 Physician Resources for Healthcare Information

A similar question was specifically asked of physicians: How do physicians themselves obtain healthcare information? This question was added in an effort 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 similar to themselves. They ranked patients as likely to obtain healthcare information from nearly any source available. Patients claimed they were much more selective in what resources they used to acquire healthcare information. Both groups in actuality 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.

5.2.8.3.9 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 in regards to health. Upon examining the subcategories, however, patients appeared to rank this method more favorably with 39.8% saying 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% that it was moderately and a surprising 43.3% 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 similar to 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 or not 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.[277] 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 6-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 6-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 consider this method of communication more favorably than do 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

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[277] 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. (See Section 5.2.9.1 below for further discussion.)

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.

5.2.8.4 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.

5.2.9 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* (tested independent variables) were associated with patient/physician favorability could further help formulate effective, future implementation plans for adopting

EHR online messaging systems (such as those in rural areas like Johnstown). Of course, no matter the outcome, the HITECH Act of 2009 was forcing adoption; but, knowing what perceptions existed, what attitudes towards 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 is chosen, direct access to the physician is 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 may feel that online medical advice would be 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 would list electronic messages as more satisfying, efficient, and effective than telephone calls. It also makes sense to predict that once this medium becomes an active part of medical relationships, it will become more popular than the telephone.[278]

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.

5.2.9.1 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 6-point Likert scale and then as a "yes/no" question (a binary dependent variable). 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 actually 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.

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[278] When I think of my own interactions with fellow professors, colleagues, business associates, and students, I tend to email rather than call them if that option is available to me. It is more efficient for me in that I do not have to have a "social" conversation before I jump into the purpose of my interaction. It also takes less time than it would for me to play phone tag, wait through long answering machine messages, or explain what I have to say to several people before I get to the person to whom I wish to speak. If this is the case with most people in the general public, then why would it not be the case with medical communication as well once it becomes as "normal" and accepted as telephones are in medicine today?

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 in particular. To know if this had an effect on 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).

5.2.9.2 Key Predictors of Efficacy

Multiple regressions run 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.

5.2.9.2.1 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 working (or 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, actually 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 the EHRs appear to be more important to patients' health (through promotion, education, etc.) help the EHRs themselves to be considered more efficacious? If someone perceives the EHRs as efficacious, does that mean that they actually 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 actually improving their medical relationships and health results? Medical professionals would do well to think about such questions as they continue the process of implementing EHRs.

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 vis-a-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 through the use of 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 compared 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 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 really 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 the future; 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.

5.2.9.2.2 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 measureable 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 mail, 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 (perhaps accessing the messages on a cell phone that rings or vibrates each time a 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 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 at a later date 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.

5.2.9.3 Efficacy versus Satisfaction

Up until now the vast majority of articles and studies dealing with electronic health communication have focused on patient *satisfaction* as if this is 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 in particular argued that online communication with patients would interfere with office efficiency, privacy, different needs of 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 whose health was well taken care of. Satisfaction was a bonus, but quality of patient care came first.

As the IOM (Institute of Medicine, Committe on Quality Health Care in America, 2001) clearly states, it is the patients' right to be treated using various forms of communication including not only face-to-face but online, electronic communication as well. This argument (though early on resisted by physicians in various circles)[279] states that it is the providers' medical responsibility to communicate in a way that safeguards patient care and to stay compliant with the HIPAA laws in the process. So long as this is accomplished, electronic medical messages meet the broad needs of more technologically savvy patients, who think that the Medical Advice option works and is important to their care.

Furthermore, as stated in Williams (Patient Satisfaction: A Valid Concept?, 1994), the vast majority of studies that claim satisfaction merely are reporting on an aspect of consumerism instead of on what is working best for the needs of the individuals involved. Consumerism is certainly an influential dynamic within the current medicological environment. Physicians and hospitals are investing large sums of money into the EHR systems and are paying even more to support and maintain secured portals.[280] However, the question is, does or even should consumerism propel the EHR market forward without the issue of efficacy? Even the National

[279] 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 actually 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 continue to exist in the "fight" against the secured portal requirements of healthcare.

[280] My husband's practice has a secured portal which cost us about $5,000 for the program, set-up, and training. We now have to pay a monthly fee of over $400 to maintain this service. Therefore, the portal within which the online medical communication occurs (as mandated by the government in the HITECH Act of 2009) is costly to set up and to maintain. This is an investment which may or may not be felt to be of value to the "consumer" who in this case is the physician/hospital. Therefore, consumerism and economics are very much part of the medicological environment when examining the motivation for effective online medical communication between physicians and patients.

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 or not a health-related endeavor or instrument of measurement was valid (Baggs, 1994). As Williams (1994, p. 515) further notes, “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 continue to be drawn and decisions made in healthcare based solely on the idea of whether or not the patient is “satisfied” as opposed to whether or not something worked in better caring for their health. In comparison to efficacy, satisfaction is a vague, “alien” term. The latter is more conceptual while the former is more behavioral and measureable.

It is therefore important to emphasize that this research does attempt to determine whether or not people perceive online communication to be working. It does not ask for satisfaction but rather it attempts to see what variables correlate with the idea of efficacy in helping to determine specific areas that can help influence effective adoption of this medium[281]. When coupling a term like “efficacy” with “importance” as in the patient survey results, it is more difficult to measure what concrete information can be provided to teach users why this

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[281] 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, etc. Indeed this study chooses to look at perception of efficacy as it is defined based upon the users’ perceptions of whether or not it is working for them individually. If members of the medicological environment actually perceive it as working, does it really matter if it is? Another 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 dissertation chooses a general one better applied to the overall space of the medicological environment.

service works in improving health. As stated earlier there are some problems with measuring this based upon how patients might define “importance” and how they might show in concrete terms what factors actually make it important to the patient. However, with the physicians’ predictors of how often they encourage patients and how promptly they reply to patient electronic messages, these are in fact concrete items that can be taught and measured. This information alone might serve to facilitate improvements in implementation procedures for assuring a better response to the medium and ultimately for a better working (efficacious) messaging system.

5.2.9.4 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 comparing the various correlations between the many 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 were 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.

As shown in Appendix D, the distribution of residuals within the patient charts does not appear to be normal. However, the distribution looks much more normal in the analysis where the dependent variable is transformed. (Compare both "Normal P-P Plot of Regression Standardized Residual Dependent Variable" charts in Appendix D to see how much closer the curve is to the mean.) The diagram shows how close the data points are to 1 (or how close the data are to the fitted regression line or coefficient of determination for the multiple regressions).[282] This visual representation shows that the data points are quite close to the regression line. There is much less distance from the mean after transformation, indicating how strong the predictor is 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, but 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

[282] At zero percent, the model would indicate that none of the variability around the mean was present; and, at 100%, the model would indicate that all of the variability around its mean was present.

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 are 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.

5.3 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.

5.3.1 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 Drs. Warner, Gray (Patrick, Jerry, and, wife, Maggie), Hoffman, Denning, Eckles, and Kastelic. This could be done now while Stage Two Meaningful Use is in process and while most if not all have adopted a system and used it for at least five years. This could be done again at the end of Stage Three Meaningful Use or in about five years after most have had their systems in place for at least ten years and have likely reached an adoption level similar to that which existed in urban areas at the time of this research. 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. It may also suggest areas for improvement in the design and implementation of future EHR and electronic messaging mediums.
- *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 there are 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 towards 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 element of this research that is missing. 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 population. With patients many demographic population difference could easily affect the adoption to this new medium including but not limited to age, gender, race, educational level, socio economic status, and location. 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 non-adopting physicians from both rural and urban areas alike.* It would be interesting to find out the reasons for refusing to adopt. It would also be interesting to find out what other options these physicians chose such as early retirement, concierge practices (retainer medicine),[283] cash-only practices, and volunteer or foreign medical practice work. For these it would be helpful to compare their views

[283] Although this type of medicine could and likely does 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 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 the EHR mandates for acquiring reimbursements for services. This is one of many ways concierge medicine can function within the system and yet not have to be penalized by the government for not following all of the mandates. This is legal and becoming increasingly more popular throughout the United States in response by 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.

about technology and the healthcare climate with the views of those who have elected to adopt. Not only might this group provide insight into the thought, feelings, and experiences of non-adopters 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 that dynamically affect the functionality of 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 socio-economic infrastructures may deeply contrast with the United States system whose current EHR adoption rate is only at 69% (Robertson, 2013). These could, however, shed light on how some countries have already adopted such medical communication mediums (such as the Netherlands and Norway who are at a 98% adoption rate) and how some might begin the process in the near future (many South American and African countries for example).[284]

All of the existing and new oral histories could be compared and contrasted in an effort to see what similarities, relationships, and patterns might emerge from the qualitative data. Additionally, this information could help shape and inform future research design and implementation in an effort to further understand the complexities of the medicological environment.

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[284] According to a Bloomberg Business report on June 25, 2013 (Robertson), the top ten countries for EHR Adoption are Norway (98%), Netherlands (98%), United Kingdom (97%), New Zealand (97%), Australia (92%), Germany, 82%), United States (69%), France (67%), Canada (56%) and Switzerland (41%).

5.3.2 Surveys

Once the oral histories are collected and analyzed, a wealth of questions will likely surface to help formulate both objective and open-ended surveys. Some specific suggestions for survey development follows:

- *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. By running these

statistics on all of the comparative data, even more complex correlations and multiple regressions could be done.

- *Follow-up surveys on similar groups of people would be helpful to measure how responses change over time.* This was not something done in this dissertation due to time restraints. 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 in particular did not exit. Now, however, this is one of the most popular (and challenging to HIPAA regulations) of all the forms of electronic messages today in that physicians do not necessarily go through the EHR secured portals and instead utilize private, unsecured devices. 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). Due to 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 may themselves help guide the types of questions asked.* Again, new surveys have surfaced with the help of the PEW Research Center in particular (Pew Research Center,

2015), and a wealth of other available government documents and websites (Joint Commission, 2013).

These suggest some of the more important considerations applicable to this environment in light of healthcare surveys.

5.3.3 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 particular 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 could be 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 (such as the "screeners" who direct the incoming messages), health administrators, insurance companies, and government officials. This, however, may be too massive, expensive, and time-consuming an undertaking; so, instead, a representative group of these members might participate in mixed-group setting. The purpose of such groups may also be varied with different guided leaders. Questions might include
- *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 age of the users was relatively young as these do not typically seek healthcare as frequently 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 great deal more incidents might provide very helpful insights into what is effective and ineffective when using online medical communication. These "incidents" might then provide additional scenario-like focus group questions or role playing activities that could lead to even more insight into the efficacy of this medium.

- *Data Mining and Natural Language Programming* (to be discussed in more detail in 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.

5.4 CONCLUSION

The point of the studies conducted here as well as those suggested above were/will be to gain as much information as possible on the nature of the medicological environment during the time that the HITECH Act of 2009 became law and thereafter. The rural area was just informed of the requirements of EHRs, which was a first step well before any discussion of electronic messages occurred. This is why the rural study discussed EHRs and not really electronic messaging. The purpose was different with the urban studies because EHRs were already in use and the Stages of Meaningful Use were being outlined with the focus on creating secured portals for Medical Advice interactions between physicians and patients. The focus on the urban study was much more on electronic messages themselves rather than on EHRs in general in the rural study.

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 (the Critical Incident Study with students) was premature and thus yielded no information other than showing that few if anyone knew about online communication with physicians at that point in time of 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 not 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. 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.

In light of the findings of the urban surveys, once again it is important to reflect back on the rural area as a space in transition wherein the information learned from the urban surveys might 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 have greater broadband access, larger university educational systems (UPMC Health Systems and the University of Pittsburgh) that share grant acquisition, less economic challenges overall, and even different working demands of health professionals, all make the two populations quite distinct. Certainly Conemaugh Health System has a residency program that does research; but the caliber and size of the projects and amount of grant funding is significantly less. Likewise depressed areas do exist in urban clusters such as the Pittsburgh Hill District, but based upon the U.S. Census Bureau, these areas do not similarly represent the depressed, more expansive region of the rural area of Johnstown. Johnstown does have access to Pittsburgh health facilities and online communication with physicians but often the broadband accessibility and speed is not as good as that found in the city, making the secured portals available but not accessible to the rural users.

All of these issues discussed at the beginning of this chapter are quite relevant in understanding not only the research designs and approaches used within this dissertation but also the medicological environment itself. Both rural and urban regions exist within this space. Both learn from each other over time. Both interact with and inform each other. The system is dynamic and interactive.

A study that only involves the rural or only the urban adoption of EHRs and secured online portals would be narrow sighted and even more limited than this small sampling of the perceptions of online medical communication users—patients, caretakers, physicians, practitioners, alike. No single research study could possibly capture even a glimpse of the rich, unique, interlocking medicological environment. This research attempts to begin the process and to show ways in which the environment can be studied. Many more studies using many methodologies and many regions across the United States would all provide additional insight into this complex, rich environment that constantly is changing and evolving. This study attempts to begin the process, to provide an awareness of this environment to help improve future adaptations of EHRs as well as many other technologies and changes of the future. When the telephone was introduced into the physician/patient relationship, it was feared as being a huge interruption of the physician, an added burden, and a medium that inhibited face-to-face communication. Now the electronic messages are argued to be doing the same thing but in a manner perceived as even more disruptive than the telephone. Next will be another such medium perhaps that also challenges the system and contributes to the dynamic, interlocking system of the medicological environment.

In considering future research design, how well the online communication works (its efficacy) is critical in helping to develop physician/patient online relationships that lead to improving health and ultimately to saving lives. The intricate factors that identify rural and urban areas that were discussed earlier in this chapter are also critical not only in understanding any differences that exist between these two regions but in looking forward to improved implementation plans in new areas with patient-centered, cost-efficient designs. As already discussed, purchasing and utilizing a new EHR system is extremely expensive not only for the individual practices but for the multiple interrelated systems: health, legal, insurance, socioeconomic, political, and governmental alike. With rural areas already suffering major financial setbacks related to location (broadband access, distance from major healthcare facilities, and diminishing employment opportunities), urban counterparts—who themselves have regional clusters of poverty—need to use their experience with EHRs and online systems to minimize costs through smoother, well-informed healthcare business decision making. Research in this area provides a practical service, but it also provides a greater understanding of how a medium can transform an environment and effectively shape future use of this new medium.

6.0 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 towards a conglomerate of for-profit industries and socio-political 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).[285] 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 broadband access

[285] In Geiger's review, he states, "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).

across the country, so too has the power of technology altered how physicians and patients communicate about medicine, now through the use of secured electronic messaging within the 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 is transforming daily health behavior, practice, and research and is affecting the very ways in which people engage in the multi-disciplinary healthcare arena.

Now electronic messages 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 de-identification 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 behavior reflect a significant change in the way medicine itself is being viewed and studied today. Caught up in the whirlwind of transformation and the practical details of trying to catch on to the adoption and daily trial and error of new EHR systems, the significance of the overarching manner in which medicine has transformed is easily lost in these details. As the culture is distracted by the immediate response to practical health matters, the larger picture is often ignored. The healthcare system perhaps is 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 learn the nuances of these policies and to claim expertise within this new technological environment. As medical professionals they have focused in on technological advancements that help their patients 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—and counting (Verdon D. R., 2013). In the process of learning how to adopt, learn, change, apply, and reeducate about 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, many of which are mediums of communication themselves, have become a source of change for the patients, the healthcare professionals, and even the researchers in medical science and communication alike.

Kuhn (1962) argues 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 surely was not talking about EHRs themselves, but his concept of the paradigmatic change appropriately fits in light of the transformative nature of this new medium in the world of medicine. As physicians rightfully cling to the traditional physician/patient relationship (the one-one-one, face-to-face method of care), a new, *additional* way of communicating has emerged through electronic medical messaging 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 has welcomed new medical equipment that facilitates 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;[286] 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 electronic health records and online medical interaction has helped influence a paradigmatic shift that can only be appreciated by looking at the entire medicological environment, the 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.

[286] Certainly 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.

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-SchoÌˆnberger, 2013). 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. The very face of medical research, education, practice, and communication is on the verge of change.

6.1 SHIFT IN PHYSICIAN TRAINING

A significant change has occurred in how physicians are being 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 in today’s society. Granted, standards of physician training accreditation have always been closely monitored by a range of accrediting bodies that monitor and provide education credits to physicians.[287] Their role has not changed, but some of the requirements within the programs they monitor, have begun to reassess course content and procedural methods of moving towards board certification. In short, the “art” of medicine is beginning to gain considerably more attention alongside the “science” of medicine.

[287] These include the LCME (Liaison Committee on Medical Education) 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 ACGME (Accreditation Council for Graduate Medical Education) for accreditation of residency programs, the AOA (American Osteopathic Association) for the accreditation of post graduate credits, and the USMLE (United States Medical Licensing Examination) for practice accreditation.

6.1.1 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, 2015). 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 University Medical Center, 2015).[288] 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 science 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

[288] This program, started by Rita Charon, MD, PhD of Columbia, is discussed in more detail in the section on Narrative Medicine below.

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 patient is considered as important, if not at times more important, than the treatment itself. A very different focus is emerging.

6.1.2 Pre-Medical School Training and Entrance Exams

The change is happening even before the actual medical school training. Admissions processes have 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, The Icahn School of Medicine at Mount Sinai in New York City announced the restructuring of its admissions criteria under its 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 Medical College Admissions Test (MCAT) or even having to participate in a traditional premed course load which "has not changed in the last 100 years" (Mount Sinai, 2013). The program aims to create "self-directed and life-long learners, who will have time to focus on courses in health policy, ethics, genetics, or biostatistics as undergraduates without being encumbered by traditional classes such as organic chemistry or calculus." 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 a 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 pre-med 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). This new MCAT exam that was 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 pre-med coursework requirements despite these MCAT changes. In effect, the transition is in process.

6.1.3 Board Certification and Continuing Medical Education

Obviously such a change in requirements, test taking, and medical course curriculums cannot and will not happen suddenly. Nevertheless, the shift is beginning and it is now being seen at all levels of the preparatory, testing, and medical school process. In fact, even in the area of post graduate medical education for state certification—the continuing medical education credits (CME) for the state of Pennsylvania, for instance—physicians are required to complete at least 20 credit hours of study every two years with 12 of the 20 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.

6.1.4 The Meaning and Direction of this Medical Education Shift

It may be asked why a discussion on pre-medical coursework, MCAT content, medical school education, and post graduate board certification matters in a discussion 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 they focus 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 of the electronic message). 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.[289] 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.[290]

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[289] As the Executive Director of the Cambria-Somerset Council for the Education of Health Professionals, Inc., I have witnessed significant change in the demand for educational programming at all levels of medical education. The inclusion of communication "tracks" within our conference programming is common largely because it appears to be interesting to the participants (as attendance tends to be high when these tracks are offered), needed as part of their "safety and risk" educational requirements, and recognized by administrative personnel who review their educational choices for accreditation.

[290] In my medical communication class, for instance, I draw students from pre medicine, 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.

Indeed 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 towards 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 electronic messages, 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 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.

6.2 SHIFT IN RESEARCH

Throughout the previous chapters, this dissertation has taken a multi-methodological approach in an effort 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 medium of the EHR itself was examined from a McLuhanesque media perspective as well. 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 the EHRs themselves (health record data) and by the electronic medical messaging (communication interaction data), physicians and hospitals alike hold at their disposal an almost 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 pre-screened data storage banks of de-identified 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 the EHR systems across the country would be to ignore one of the most promising future possibilities of this new medium.

6.2.1 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. 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. Who accesses the EHR, where it has been forwarded, and when these transactions took place is all recorded. Every aspect of online communication between the medical professionals and the patients are 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 corrected it later. All corrections of mistakes remain visible. Nothing is deleted. Even this metadata, or "data about data," is in many ways as relevant to the information stored in the EHRs as the patient charts themselves and is likewise necessarily protected by the laws of privacy (The Sedona Conference, 2010; AHIMA, 2013).[291]

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[291] 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

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.[292] 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

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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 similar to "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.

[292] This of course is how breaches have been identified in multiple high profile cases and many minor ones throughout the country. If someone access 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 simple cannot be done by anyone. The record remains within the metadata and the possibility of someone finding out this breach is always there.

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 has started and will continue.

6.2.1.1 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 explains that the traditional model for research using the scientific method takes about six years. In contrast he says he has come up with an online survey of questions in which he has 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 20 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 turn-around 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 is 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 in an effort 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 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 prepares for requirements in Stage Three Meaningful Use for interoperability between EHR systems, the need for systems not only to "talk to" each other but to share the data with each other begins; and with this "sharing" comes massive regional and even national storage centers that can access and study information that is forever preserved. This means that not only can 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, New York; but the entire health record is instantaneously accessible to the entire team of informed specialists who can be ready to care for the patient immediately upon arrival. Additionally, the data contained within that medical chart can 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. Currently, for example, a portal called the "Massachusetts Clinical Gateway" will unite the Massachusetts Life Sciences Center, the Conference of Boston Teaching Hospitals, and the University of Massachusetts Memorial Medical Center. The organizers are 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 will be part of this portal system in the hopes of developing global research (Walsh, 2015). This is one example of the evolving process of attempts to collaborate, readjust, and adapt to the magnitude of information and the research potential of this plethora of data. Right now such gathering of resources are notable; but it is predicted that all such data may become centrally located and used for storage and research. The EHRs of the world will not only be interoperable; but the information within those systems will be interchangeable and useable for individual as well as for global research.

6.2.1.2 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 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.[293] Early on observations were made with very little instrumentation. To generate millions of samples would have taken a lifetime or at very best many, 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 a number of 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

[293] These terms were used in the early 1980's by Donald B. Egolf, PhD in his Communication Research Methods I class.

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 lead 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 lead them to remarkable discoveries.

The tediousness of these earlier research methods demonstrates how difficult such a discovery process is without the use of a computer.[294] Now with even larger data bases, 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.[295] 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

[294] This is not meant to diminish the research of Snow and Nightingale. Their ability to identify patterns with the naked eye lead to remarkable discoveries. It is difficult to surmise how their findings would have been uncovered and supported through the use of 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.

[295] 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.

variables.[296] 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 they also have to figure out how to *interpret* the results.[297] This requires a team of skilled experts in such areas as medical science, computer programming, analytics, and communication (to name a few).

However, again, the medium of the computer is the reason for such huge data sets. That is, its ability to store and sort a vast array of information causes the generation of so much data; and, in turn, so much data requires a computer program to sift through the information to find patterns. The medium itself has not only created this magnitude of data but it necessarily is the only thing that can handle studying it as well. Some may justifiably argue that this endless resource merely creates vast stores of useless information that may never be used or may be difficult to "find" or access. 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

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[296] There are in fact aspects of data mining that can be quite tedious including de-identification of data, word bank organization, and the like.

[297] 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 specialist 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.

the integrity of the information in the EHR, 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. 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.

6.2.2 Big Data Research in Interactional Descriptive Analysis

There are many ways to analyze Big Data. This section demonstrates one approach to how descriptive analysis may be done on actual 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 or not 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 within the secured portals 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 particular 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 represents an actual research study in progress, I include it here not so much to discuss its results as to show an example of one medical communication research design using Big Data. This example likewise demonstrates just how differently data is 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.

6.2.2.1 The Raw Data

This research segment represents only part of a much larger, subsequent study that is being 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.[298] 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.).[299] 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").[300] 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.[301]

6.2.2.2 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. I simply wanted to describe the interactions within each

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[298] 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 of 2010.

[299] Full IRB approval was gained through the University of Pittsburgh with the understanding that Dr. Gary 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 de-identification before anyone else studied the messages. All data was stored on the UPMC servers and only a single computer in Dr. Fischer's private office was used to access the data until it was fully de-identified.

[300] 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 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.

[301] 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.

physician/patient dyad to see what 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 basic 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.[302] 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.[303]

To test this theory, a lexical analysis was used based upon type/token ratios (TTRs). This method is designed to examine 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).[304] 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) are represented by a TTR equal or closer to 1.

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[302] The applications were technically developed by the computer analyst/programmer, Yale Cohen, and, directed by me and, particularly, Donald B. Egolf, PhD, my then dissertation advisor who had worked very closely with me on this part of the project. Their computer expertise and Dr. Egolf's background in lexical analysis in speech pathology helped to provide a framework for the program creation. This research also reflected the process that Dr. Egolf had used many years ago when he developed his own computer program to analyze conversations between speech pathologists/counselors and patients over the phone. This was the central focus in his dissertation; but the data set was telephone conversations as opposed to online interactions. The disadvantage of the telephone conversations, of course, is that oral communication needs to be transcribed and emails are already in that format. Multiple discussions of his original project provided insight into the idea for this analysis. Interestingly again, when Dr. Egolf began his project nearly 40 years ago, he had to do much of his work by hand and would arrange computer printouts across the floor to try and "see" patterns. Now the program does much of this work. However, as is discussed below, there is still a lot of hands-on work with the raw data, just not as much as in years past. The methodology has certainly changed in this paradigm shift.

[303] I compare this uncovering process to an onion skin. As one goes deeper towards 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.

[304] This method of analysis is typical of "readability" measurement for analyzing the "grade level" or complexity of a particular document.

Any assumptions about interpreting the TTRs must be tested, of course, by always going back to the actual data. As with any data mining project, it is very important that the findings by the computer are tested against the actual data. This is considered a cyclical, iterative process of testing and retesting of the assumptions with the basic goal of each TTR analysis being to provide a quantifiable estimate of one aspect of a person's speech that can be used as a firm and objectively verifiable basis for comparison.

6.2.2.3 Preparation of Data: De-Identification 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.[305]

In the case of this study, the most important yet most difficult task was to de-identify 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 a De-ID program was run on all of the data before I was permitted to begin reviewing the data (due to HIPAA regulations). 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

[305] 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.

identifier that the computer program may have missed.[306] All words that appeared to be misspellings were also corrected.[307] Since many of the terms were medical, I used medical dictionaries to check the spellings and then had Dr. Fischer 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.[308]

As I was making the de-identification, misspelling, and abbreviation corrections, I began to notice 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. After much examination a total of 39 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

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[306] For instance, I came across the word "white" often. I questioned this and realized 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 Dr. Fischer also review any questionable terms (such as the "white" example") until I felt the data was adequately cleansed. This process was multi-layered and quite tedious; but it was necessary to guarantee any possible offense against HIPAA regulations.

[307] 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 de-identified messages. By now many of the sentences had words eliminated (de-identified) 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 this 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 it must be remembered the massive size of this data set and the difficulty in going back to the data itself as often as possible.

[308] 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).

diagnoses, treatments, symptoms, medical abbreviations, and pain (Appendix E). 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 (Appendix E shows how males and females 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 and more as patients learn the terms. Once such clusters were found in the data set and these dictionaries developed, there would be an endless variety of hypotheses that could be tested as one correlation of variables leads always 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 as one becomes closer and closer to interpreting the meaning inherent in the data. The same data set can be used over and over again 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 (which is the design of the full set of dictionary lists as sampled in Appendix E). After further analyzing the data, however, some words seemed to overlap categories. This caused somewhat of a problem in performing a pure TTR study; yet this was the reality of the data set. This suggested that a sort of topography of relationships existed between the various categories of the words used with the data set. (See Appendix E for a diagram of one such topography identified with overlaps in the dictionaries related to "Medical Jargon.") Such visual displays of data are now possible in some computer programs available in other computer languages. These are based upon frequency of words that can be visually clustered together according to frequency of use. My program and study, however, also show the overlapping relationships between the dictionaries of words in addition to the frequencies of their use.

The information generated through my data analysis could lead to a full typography of interrelated and overlapping terms used by the patients and physicians. Perhaps similar smaller typographic representations could be created for each dyad or each type of patient illness. The possibilities are endless once the computer program is designed to check for such relationships between the various categories of words. Importantly, not all 39 of the categories are represented in this diagram, which only includes medical terms related to medical jargon. It is possible to imagine a wide variety of visual representations or a complete topography of these dictionary terms. In short, this phase of the analysis reveals that the dictionaries alone and the potential topographies (visual representation of the data) they reveal might lead to an enormous amount of additional research findings. The conclusions drawn from applying these dictionaries will depend upon the hypotheses formed, tested, and retested through layers of iterative analysis. As the data is tested, more relationships may be noticed and more hypotheses formed.

6.2.2.4 Relational Computations: A Lexical Analysis

Once the data is de-identified and fully prepared into dictionaries, a wide variety of computations may be performed. This particular analysis looked at 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 or not these threads showed any increase in word sharing (the CMM or Coordinated Management of Meaning).[309]

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 where 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

[309] 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 actually 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.

scores a massive report was created that showed that overall communication did indeed seem to change over the duration of the interaction.

This was a massive data set that could not have been analyzed by hand. 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.[310] 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, particular questions were asked: Who were these outliers? Might there be any demographic information on any of these that might suggest these differences?[311] 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

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[310] Outliers could also be those who used the online communication the most and those who used it the least (only one interaction).

[311] 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 Dr. Gary Fischer, but he would not and could not make comment due to HIPAA and IRB confidentiality regulations.)

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 de-identifying 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.[312]

6.2.2.5 Results and Applications to Future Research

As stated earlier, this is an ongoing study that likely could involve a lifetime of analysis—even with this single data set. Many more iterations could result with endless applications of the dictionaries, the topography/visual data analysis, and the linguistic analysis. 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 are endless.

At present, results from this analysis have shown 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

[312] 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.

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 towards saving lives.

6.2.2.6 Natural Language Programming and Data Mining Research

The complexity and detail of this ongoing study is remarkably great in that it required not only the standard de-identification, input, and analysis of a massive data set but also the development of an independent computer program in a language that the programmer knew well (and could interpret). 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 Program (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.[313] Other options may be available now to approach this same data set from a similar yet equally unique perspective.[314] 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.[315] 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.

6.2.2.7 Online Messaging in EHRs and the Medical Relationship

There are many considerations in conducting research using Big Data. One thing for sure, it means that the volume of research materials is increasing. A recent report has shown that 41% of health executives say that their volume of data has jumped by 50% compared with only one

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[313] This portion of the research was done with my then dissertation advisor, Donald B. Egolf, PhD, and a computer programmer, Yale Cohen whose familiarity was with Perl programming language.

[314] 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.

[315] The computer must be programed 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 in an effort 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.

year ago (McCann, 2015). This increase in data generation not only means that physicians and hospitals are using EHRs more, but it also means that more data is now available for research applications. The point is, Big Data exists no matter the motivation for its use—patient care, disease research, or medical communication analysis. All EHR-related motivations, perceptions, and applications are part of the overall understanding of this complex, ever-changing medicological environment.

This discussion has attempted to demonstrate how computer programs provide the means for analyzing the huge data sets produced by the EHR systems. This particular example of content analysis additionally shows that the medial electronic messaging 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 relationship 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.

6.3 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 and ultimately the government that the online portal is being used enough to warrant Meaningful Use so that the hospital and/or physicians' offices can receive their incentive payments. As time goes on, there are other incentives with insurance companies, for example, rewards for active online use through higher reimbursement fees per patient who has that particular insurance.[316] 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 of Meaningful Use, without question, drives participation forward (perhaps more than the "patients' rights" side). It is hoped that once patients become accustomed to navigating the portal, they then will elect to use it even without the electronic notifications.

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 the 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 the EHRs. With more and more patients gaining access, sending

[316] There are actually 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 have to 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.

electronic messages concerning their health, and even making corrections within the charts,[317] the possibility of someone seeing something they are not supposed to, increases as well.

6.3.1 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 dissertation, 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 great detail 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.

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[317] 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.

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.[318] 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, of particular importance to 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.

[318] 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 in particular 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 thangs 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.

Because of these safeguards, this information is more protected, yet still remains in the electronic chart under protected mode (without the patients' or others' ability to see it).[319]

Some feel that even this data needs to be shared with patients (Warner & Warner, 2015) despite the fact that heretofore any information that the physician or healthcare provider might deem physically or mentally harmful was allowed to 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.[320] 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

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[319] 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; but 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

[320] Another area similar to 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 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).

been challenged (Robert Wood Johnson Foundation, 2013).[321] 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, in fact, is considered to be 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.

6.3.2 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 of 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

[321] Currently over 19,000 patients in Boston, rural Pennsylvania (Geisinger Health System), and Seattle have been 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).

access to their records? How many patients even realize that hidden in their healthcare costs are fees for such services?

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 as patients find it difficult to access their medical information due to controls placed on the information by systems that monitor the 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 particular 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 (which it is supposed to be required to do), 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.

At this turbulent time in the medicological environment, this is a central problem that needs to be resolved if the United States is going to carry out its mandates for Meaningful Use Stage Three. (See Chapter 2.) According to the Federal Register of March 30, 2015 (Department of Health and Human Services: Centers for Medicare and Medicaid Services), all systems will be expected to achieve interoperability or eventually be penalized through the government reimbursement system.[322] The problem is, that the details for administering Stage Three Meaningful Use are still being examined, tested, and challenged. This is a volatile time, a

[322] This is similar to what is happening with Stages One and Two of Meaningful Use as discussed in Chapter 2.

challenging time, and yet a very interesting time to witness how the medicological environment is adapting to change from this new EHR medium.

More specifically, forcing this change through mandates provides motivation but addresses only half the problem. The fact is, systems are 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 1900's, 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).[323] 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.

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323 In the actual hearing the Chairman of the Committee proposed, "If the Marconi Co., which is the strongest company existing to-day, 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.

To accomplish this, technical sharing issues surrounding various EHR systems appear to face considerable work before universal formats can allow for full interoperability between systems. At least this is part of the vision of the HITECH Act of 2009. As of 2015, one of the largest and most influential of all the EHR systems is Epic (which is mentioned here as it is the one used by UPMC at the time of this research). 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 of 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 towards interoperability (and possibly to appease the accusations of creating "roadblocks" for data access).

Moving forward, it appears that the only real solution, would be stiff penalties for interoperability restrictions, fees, and/or violations. In fact, as of January 1, 2018 (Tahir, 2015), all EHR vendors will have to attest that their software is in compliance with interoperability provisions or face significant penalties if they do not provide data-sharing. This has been stated in the newest version of the 21st Century Cures Act, which is legislation developed by the House Energy & Commerce Committee to facilitate medical technology and biomedical innovation (2015). The challenge will be how well these regulations will in fact rectify this complex issue surrounding interoperability.

Closure to this problem appears to be a long way off. Some argue (Caspi, 2015) that interoperability can be achieved through a standardization of application programming interfaces (APIs) that allow for a set of protocols and tools for software applications. In Stage Three Meaningful Use it is proposed that APIs can require patients to login with one set of credentials that allows 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 need 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 seems to remove the "IT bottleneck"; but the universal use of API frameworks might be a long time in coming. First, control over EHR interoperability needs to be centralized, out of the hands of monopolizing systems; and then the information technology personnel need to develop interoperability mechanisms such as the API framework that will allow such universal access.

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 adapting to the many changes inherent in this medium may be a long time in coming—or at least until 2018 when interoperability requirements are supposed to be imposed. By that time, perhaps, new problems and concerns not yet realized may arise.

6.3.3 Security Issues: Information Breaches, the Cloud, and Responsibility

In and of itself, interoperability sounds like a very 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. New tests should not have to be done every time a patient sees a specialist. That specialist should easily see the results immediately without wasting precious time waiting for results or 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, perhaps this sounds like the best case scenario. At the same time, however, laws may be in place to protect the security of information, but such open sharing and access surely could simultaneously open the doors for even more serious breaches of healthcare information than what have already occurred. According to the 2015 Second Annual Data Breach Industry Forecast (Experian Data Breach Resolution, 2015), "the potential cost of breaches for the healthcare industry could be as much as $5.6 billion annually" (Ponemon Institute, 2014). Medical record breaches have occurred for 4.5 million patients from 206 hospitals across 23 states; and this represents only 42% of the major breaches reported according to the Identity Theft Resource Center (Experian Data Breach Resolution, 2015). The human elements of intentional information theft as well as unintentional professional carelessness combine to make the ideal of interoperability and sharing a less than perfect objective.

Ever since medical records have gone online, an increased concern for the security of data has rightfully emerged. Certainly credit card breaches such as those connected with Target and Home Depot in recent 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 and perhaps not yet realized consequences.

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.[324] 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.

[324] 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.

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 VPN (Virtual Private Network) added security for that particular device. Hospital systems in particular are likewise at fault as they typically 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 electronic messages (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 relatively new promotion in hospitals today is the BYOD or "Bring Your Own Device" movement wherein medical professionals are no longer provided a mobile phone or computer but allowed to access information on their "own device." This may save the company or hospital 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 set-up. What is frightening from a security standpoint is that very few hospitals let alone smaller medical offices follow this practice, partly because it has not been 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, OCR's (Office for Civil Rights) 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).

EHRs are safeguarded by secured portals which are password protected. Electronic messaging 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. A fairly new concept called the "blockchain" is now also seen 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 (electronic medical messaging). This new approach to cyber security, storage of huge data sets, and interoperability may very well be the wave of the future. For now, however, the problem remains.

Some choose to simply ignore these concerns. Often I speak on issues of privacy and social media professionalism at medical schools, for residency programs, and at private medical conferences. Each time I do, I am shocked by how surprised and even ambivalent the audience is concerning these matters. Employees seem to feel the problem is larger than they are. Hospital administrators whom I have spoken to have brushed my questions aside saying that they instruct all their medical professionals to not use any information on their mobile devices (particularly text messages) that could in any way identify the patient. However, somehow the healthcare professionals who are exchanging the messages *are* able to figure out which patient and medical issue is being discussed in the electronic message. Does this not suggest that someone else who intercepts or gains access to these electronic messages might likewise be able to identify the patients who are being discussed?

Indeed this is a very large issue and one that must be much better addressed in the immediate future not only by hospital administration but by all users who should demand that administrators help to protect the electronic medical messages that they need to exchange in order to conduct safe, risk-free healthcare within this medicological environment. The need exists; yet the commitment towards finding the means for solving these problems remain. Too often the healthcare profession boasts of its secured portals and spends its time trying to learn to navigate the EHR system. Too seldom are the security needs focused on enough.

6.4 THE MEDIUM'S MESSAGE IN THE MEDIOLOGICAL ENVIRONMENT

Privacy issues are real. Solutions are not easy. Applications and adoptions of this medium are multifaceted and will continue to be far-reaching into the future of healthcare. Often a technology's thrust towards the unknown possibilities of the future gets so caught up in what new things it can do, that people fail to take pause in realizing potential dangers that are also associated with that medium. This is not to say that electronic medical messaging within the EHRs should be discarded or that advancements should in any way be slowed. On the contrary, EHRs and electronic medical messaging 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 once new medium such as electricity, the radio, the TV, the telephone, or the Internet, the power of the medium lies within its potential, far-reaching application to the future. The medicological environment thrives in the midst of 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 emersion 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 and open 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 while using the medium of electronic medical messaging within the EHRs, in an effort to facilitate and assure our own health.

APPENDIX A

ORAL HISTORY RESEARCH MATERIALS

A.1 ORAL HISTORY DEED OF GIFT

Deed of Gift

Interview with ____________________________________

Location/Place of Work_____________________________

Date/Time(s)______________________________________

As part of my graduate research for the degree of Doctor of Philosophy of Communication/Rhetoric, I am conducting this interview concerning the use of Electronic Health Records and Electronic Messaging between physicians and patients. Your interview will be reported on in my dissertation titled, "An Exploratory Study on Physician/Patient Electronic Messaging within secured Health Portals." It is also possible that parts of this interview may be cited in subsequent professional presentations or publications. My purpose in obtaining this research is to learn more about the process of converting to EHRs in rural areas and of using online communication with patients. I believe you are particularly useful in informing me about this topic because you have witnessed the effects of the HITECH Act of 2009 and have participated in the conversion process from paper to electronic charts.

Please read the agreement carefully before you sign it and feel free to ask any questions you may have regarding its terms and conditions.

I, of ___________________________ (location and/or business affiliation) do herein permanently give, convey, and transfer my oral history interview to Susan M. Wieczorek who is a PhD graduate student at the University of Pittsburgh. In making this gift I understand that I am assigning all rights, title, and interest in copyright to Susan M. Wieczorek. By virtue of this assignment, she will have the right to freely use these interviews for the above indicated academic purposes. I understand that once this study is complete, she will place on file a recording of the interview and any available transcripts in the Communication Department of the University of Pittsburgh. In exchange for this right, I reserve my personal right to review any materials prior to publication, to hold a copy of the full transcript in my personal possession, and to review and/or make corrections to any materials that might be published as a result of this interview.

If there are any additional restrictions to the above document concerning the use of this interview and recording, please note:

____

______________________________________	____________________________________
Narrator/Interviewee	Interviewer
______________________________________	____________________________________
Date	Date

A.2 SAMPLE TRANSCIRPT

Note: Recorded Interviews, Transcripts, and Deeds of Gifts Archived in the University of Pittsburgh and the University of Pittsburgh at Johnstown Communication Office Departments

Dr. Patrick Gray January 2009

Name and back ground:

I am a life-long resident of windber Pennsylvania and graduated from high school in 1993 I went to West Virginia University from 1993 to 1997

Temple U Sch Med 97-2001

Internship in Internal Med residency at West Penn H

2 Yr Int Med Resident at WVU Hospital.

Pvt practice w fr. Have 1 partner, abt 7000 pts. In Windber

SW: Here mostly to talk abt use of tech w/I the med interview and wondered if you could tell me if in general what types of tech you use in the pt room or what types of main tech you use.

PG: Right now I know there are a lot of phys that use multiple modalities as far as new tech things I know some use PDAs, cell phones and I-phone, we have come a long way, and now carry computer with you in your pocket, once we have better batteries and more wi fi hot spots the day of the desktop and lap top are numbered but others that replace them are too small to type with.

I do not quite have all that stuff in here. What we have now is EMR and filing sys whereby all paper records transferred over to a main frame computer system. We also have access to any one of our patient's records and charts including lab studies, progress notes, consultation notes, correspondences, and anything which you would need in a pt interview. I know a lot carry around PDAs. I don't because we are in a fixed location. I have the advantage that I can go back to my desk and do anything I want so having a PDA would be an unnecessary expense but certainly when I was in residency in 2004 when I grad they were just coming of their own with the use of PDA. We were actually getting to the point where we were going to start beaming pt sign outs back and forth to ea/o, we were also going to be able to adapt to at that time….at least that is what they had envisioned for the fall…of course I got out right at this transition what we were envisioning was that you would do all your orders off your PDA and it would go instantly into their computerized file system (at WV H) they had the sys supposed to go online around June 2004…I have not been there since….

They had sys in place that you could be clear on other side of campus, put pt orders into your pda, say you got home at 2 in morning.... one thing they were looking at were direct pt order system most places right now have hand written orders that are taken off by a secretary, transcriptionist or nurse and then they are put into comp and order carried out.

SW: pardon me, they are put into the computer by scanning them or typing them?

PG: Typing them in. there are various, right now our hospital in Windber we have a computerized ordering system where right now secretaries take the orders off the paper put them in computer and they come out as discrete data, for example let's say I order, put the pt on

Tylenol as needed for 6 hrs, I hand write that, it would go to pam the secretary and pam would type into comp then it is shipped down to the pharmacy and it comes out in the patient's ....ahhhhhh it automatically come out at the pharmacy or it goes down to the pharmacy ahhhh they were working the sec out so that it was a direct phys order system giving the physician accountability so that they can't say well this is what I meant. But actually a lot of ways that is a good thing although that becomes time consuming with things. Then again, we are moving into second gen of using of pdas and that is why I came back into town but unfortunately with our prior group, I took a major step back. Because all we had was paper records, a several phys who were completely unwilling to adapt to modern medicine and those things. We didn't even have comp except the billing office computers and I remember it was almost embarrassing when I'd have medical students, I'd have physician's assistant students, I had one guy and the first thing he said was …ahh he was a medical student from penn state and the first thing he said was, well dr pat, where are all the computers….ha…and I had to sit him down and explain to him that I am practicing with a bunch of gentlemen and this is no offense to people in their 50's and 60's that have been practicing a certain way and are not interested in changing. Part of the…

SW: pardon me, when they said, "where are the comps?" they meant in the pt room?

PG: anywhere! In the pt room, physician's offices, no computers….there was no way you could Google things, no way you could get any reliable information. That is part of the reason that dad and I are here today, you know I have to credit my father quite a bit because he was very visionary when it came to computerized medical records and transcriptions and seeing that these things were going to be what the future of medicine. We were talking to our software vender and they said, “You guys do realize that you are five years ahead of everybody else in this area as far as your computerized filing system right now.

SW: May I ask who your software vender is?

PG: It was Lantech from Pittsburgh. They actually said you guys are about 5 yrs ahead and when we do make the transition which is going to be mandated by the federal government within a decade to go to EMRs, a lot of these places are not going to be ready and unfortunately medicine and everything else is just like, I hate to talk about Darwinism but it’s true you know, if you don’t adapt you become extinct. And unfortunately some of these physicians that want to stay with these paper records and hand written charts and things like that are not going to be able to survive in five years. Now that is good if you are 60 years old and you don’t care. But if you are trying to bring on new younger physicians into the fold you want to adapt to these things. The problem is that at some point your patients are going to be smarter than you because they’re sitting at home on WEB MD they’re sitting at home on google, pulling up any bit of information they want and they are coming in there and challenging you with that piece of information.

SW: How do you feel about that?

PG: I……think that it has……..well………first of all I think the Internet is a very dangerous place. If put in the wrong hands, there can be a lot of misconception about what you read on the Internet. Otherwise there would be no need for doctors.

SW: You're referring to medical information.

PG: Medical information, well………any information you get on the Internet. If you don't know how to interpret what is actually there…if the pt are coming in Goggling things, looking things up…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, [changes his voice] "Well I read on WEB MD this that and the other thing I'm not going to that quack anymore."

SW: so they come and tell you about another physician?

PG: Yah! Exactly or one other piece of very wise advice my father gave me very early in he says, "Beware of the patient who comes in complaining about the other physician because guess what? You're next!" Ant hat has held true. Any time I have come to someone who has come to me horridly unhappy with their prior physician and the things they did except when they had a personal out with the physician like an argument and you parted ways, usually those people are not too bad but it's when the person is sitten around second guessing their doctor and are using their computer and stuff…thing is you better be ready and you better be able to challenge them when a pt comes in and shows you a piece of literature you can't sit there and say, "oh that's a bunch of crap" any more.

SW: Do you feel that it makes you more accountable?

PG: Certainly a lot more accountable and it forces you to keep up with current medical issues

SW: Do you think that the fact that they are coming in with this information alters your perception of that patient or….

PG: NO!

SW:……or the way you deal with that patient.

PG: not at all, see, some people feel very threatened by that. I have never felt threatened by that…unless they come in using it in an accusatory manner like the pt that comes in with a headache and they say, "Hey doc, I googled this on the Internet and I saw this and I think this medication might be causing it." Now that is someone you are going to listen to. Now if someone says, "Well you quack you don't know what you're talkin about; you're given me this pill and it's giving me a headache…..and w ell my niece found this on the Internet……….." Well, that one is going to alter your perception. It's a whole different approach but I will tell you that if I have 20 pts that bring me in an article from the Internet they bring it in to me to discuss it with me not to accuse me. I'd say 198 or 19 out of 20 bring it in to discuss it with me and not in an accusatory manner. And I think also you got to be able and willing to say, "Well I didn't see that article and I wasn't aware of that information." People realize we are all human and we are not able to store all these things in our minds.

SW: Do you notice a difference in age? As far as who is using the Internet?

PG: I think you would be very, very surprised.   In fact I would tell you that most of the people coming in with articles off the Internet, articles they Google are people who are in their 70's.

SW: Really? Are they physically using the Internet or are their….

PG: They are physically using the Internet

SW: not a patient advocate….

PG: No. You would be surprised how a lot of retired people who have gotten in to dealing with computers because a lot of them have a lot of time on their hands. And entertainment wise I have to be honest with you I don't watch TV much anymore because I spend all my time on sports blogs sites because I don't enjoy what's on television any more other than live sporting events and there's a lot of entertainment value on the Internet and on computers and things like that and you are finding more and more people like that in fact I have a friend that's a retired boss at Wheeling Pitt Steel and he and I chat back and forth on the computer all the time, I have been at his house, I met his whole family, and Jay actually leaves home, his wife is working and he has kids my age and he just sits home at the computer…with nothing else to do.

SW: How old is he?

PG: Jay is 62. I don't see an age variance…

SW: In light of that do you ever commutate with your patients by email.

PG: I do not. There are a couple of reasons for that. It leaves you—First of all I don't check my email all the time and there's been stuff that has been sitting on there for two or three weeks and I still have not seen yet. And it puts you in a liability risk actually to communicate by email because if somebody emails you a piece of information and you don't respond to it, you know….who wants to get an email, "Hey doc I 'm having chest pain" and not see it until five days later when you read their obituary in the paper? That opens you up for a whole new set of litigation so I don't get involved with that.

SW: do your patients ever ask you to be able to email you?

PG: Once in a while I get a request and I usually honor it but I do tell them straight out that I don't check my email every day and if you need to get in touch with me you are better off calling my secretary or my nurses in the office or page us through the emergency room through the hospital.

SW: have you ever given medical advice over the email?

PG: I have. The last pt used to routinely do that with me moved to Baltimore. He moved here from there, then down to Meyersdale. He and his wife got divorced. He was in his 60's. he decided he wasn't happy with his life and moved back to Baltimore and get a divorce. She's still here. She’s my pt. But he quit corresponding with me by email because he is back down there with his physicians.

SW: Do you think if you were reimbursed for an email or if there was a more systematic method would you be more….

PG: for me it’s not a reimbursement issue. I don’t even worry about that too much. My greater concern is the potential med mal issue. Because if you’re not checking your email….Does that mean I have to check my email every hour at home because someone wants urgent information in the middle of the night. I think that opens up a whole other can of worms. It’s like if you give your home phone number. In fact giving your home phone number is less dangerous because at least you pick up the phone and maybe it is more annoying…but at least you pick up the phone, you get the message, you know what is going on. Email may sit there for three or four days without your reading it. To me it is more of a liability issue than it is anything else anyhow, than it is the reimbursement issue.

SW: What about the issue of time?

PG: time? It takes me just as much time to email someone than it does to write them a note. My main reason is the liability issue.

SW: and your secretaries don’t communicate with your patients either by email?

PG: no actually, we call them. There are some things at least for now that the old ways are still the better way until there are major advances made in the next 10 15 years….and then you come into another thing…you email somebody something and then THEY don't check their email for 4 or 5 days. If you are guaranteed…yah it goes both ways.

SW: You also talked about your EMRS. Could you tell me a little more about that as far as your communication with you and your patients which is what I am mainly focusing on. For example, you talked about WVU Hospital and the difference with y our previous practice you worked at and your own practice now, are you fully implemented with your EMRs?

PG: We are actually going with a second generation of EMRs and are going to install that system in March. Where we are with that right now is only electronic filing system, ability to pull files, a prescription writer which we can send via fax to pharmacy that is the only really active part of our current system that we actually have. What we are going to do is fully EMRs. No paper records right now. In fact we shredded all the files. Our file system is completely electronic but we don't have an electronic ordering system….we don't' have one of those second generation things that generates notes for you.

SW: let me go back…ordering system, explain what that means.

PG: When you have an interfacing system which I don't know if we are going to get up here in Windber in the next ten years. The problem is we are ahead of the curve, thank god we have been ahead of the curve but if you don't have an interface that automatically takes off the orders it doesn't help us much. Now we will have when we get the new system that let's see if I'm in seeing Joe smith in the office and I think he needs a chest x-ray, put on an antibiotic, a steroid pack, and inhaler, by clicking on the board, the computer with a pen I can click all the things that need to be done and all the pharm and x-ray orders will be generated in to the front office for the pt to be taken down to the pharmacy and hospital.

SW: you wouldn't be typing those in, the options would be on the screen?

PG: Yes. Right now we hand write, nurses call them in and scan them in. but in a perfect system you aren't able to do that and it's automatically sent to the hospital and pharmacy what the pt needs….without the pt ever actually….paperless and no phone calls….but we will not see that because of a lapse in where the hospital where we admit at and our own position and they are 5 years from now and they have a lot of physicians in old fashioned methods of doing things. Unfortunately, if you don't' adapt you become extinct.

SW: Let's go back to your pt interview…you said you don't' take the computer into the room with you and you don't have a pt physical chart and…

PG: here's what I do: I sit down before the pt interview. Any piece of pertinent information and I review pt chart and anything over the past nine months and I have it all in my office and I review it and anything I think I really need to discuss with the pt. I will print it out and I take it in with me to the room to discuss it with the patient... there is a problem , a communication problem with you sitting down and talking with your doctor. This is an old fashioned thing of mine….sitting down with your doctor and the whole time you are sitting there with your doctor he is sitting in front of the PC and not looking you in the eye and listening to you. You know it is bad enough pts don't' think we listen to them. Now maybe it's just the way I was trained and the people that trained me. The pt 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. So I leave all my filing, I'll read a gentleman's progress notes and pull out anything I think is important…I have some paper in front of me that I will shred later and I will go ahead and write down my orders by hand….today we will do this this and this and I'll write those things down, nurses take those orders off and then we scan them into the computer.

SW: So as the pt is talking you do take some notes.

PG: Absolutely, I hand write notes that are scanned and then shredded. (HE SHOWED ME.)

SW: So you said ….(review) did the residency training program have computer in rooms?

PG: No no. again that was 4 years ago it was all still in its infancy and we were not that far along….When we were a medical student we were still taught to be doctors first not technicians. I mean at some pt there is still an art of medicine; it's not all science and technology. I think a lot of people forget that. And this is still is a field where you build rapport and lifelong relationships with your patients and not just sit there and diagnose them with their problems especially being here as a small town physician. I still think that a 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 you 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.

SW: Do you think it is heading in that direction? What do you think?

PG: Well I think that it's one of the problems with technology. Everything has its pitfalls. I do have a colleague that has a full EMR system and he takes his computer in and texts while he meets the pt….and doesn't look the pt in the eye and while he is a very, very brilliant young physician, he knows what he is doing, his patients HATE HIM because they don't think he is listening to him.

SW: How do you know that?

PG: I know that because I know several of his patients who are also friends of mine. He is also not a local physician. We went to medical school together.

SW: So that personal touch you think has interfered with…

PG: I think things are not being used correctly. I am not saying you can't sit there with the computer. But you still have to be able to communicate things with you pts. It's just one of my own biases….I still believe in the hand shake and the smile and look them in the eye. I don't think they think they think you are listening to them.

SW: How about using it as an educational tool?

PG: ….Well, here's where we are with that. Textbooks are now essentially obsolete. By the time…even when I was in med sch. We said by the time a text comes to print, the newest version of Harrison's Principles of Internal Medicine for instance …the gold standard….but by the time Harrisons comes to print it is already outmoded by three years.

SW: And as far as a pt educational tool?

PG: The biggest pit fall with this stuff is you can't have your brain located here on the pda. You can't have it on the computer. You still need to learn clinical skills and I have a PA student who is with me this month and we had a long talk about this the other say she says, "Gee I wish I would have spent more time committing this to memory instead of using my hypocrites." That spoke volumes because to be an effective healthcare person, you have to be able to actually use these as tool but not a replacement for the human mind because the human mind is still 10 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. As a physician I have great respect for that, especially when it malfunctions. You can't have that ectopic brain in your hand or in your pocket or phone and become so dependent on it that it becomes who you are instead of knowing the basic sciences….physiology. Sure when I want to know the dosage of some unusual medicine I don't know, I Google it. But the thing is I should be able to know that I know how to use that medication and in my mind I have to know that is the right medication to use I don't necessarily have to know the dosage. You should be using the tool and computer to fine tune what you are talking about not having it as the basis of your knowledge. A lot of younger physicians and younger PA's nurse practitioners are becoming dependent on these instead of actually learning their clinical skills. And that goes back to the people I worked with in medical school. I worked with some clinicians…like Eric [my husband]. Those guys learned to use their skills. They didn't learn to rely on a PDA for information and that's where the art of medicine (the hand shake and the look in the eye) must not be lost in all this technology.

SW: time limit….anything else……

PG: I think we are heading and the govt is going to mandate….we are headed to an era of full EMRs, paper system will be of the past., ….technology is a wonderful thing but like everything else in the wrong hands it can be detrimental to your patients and I always caution that any young physician coming out of school to remember what you were taught in medical school that is actually, the basic stuff is more important than what you can pull off of Google, because if you are totally dependent upon Google you are not doing your patients a service. They can sit and look that stuff up. Be prepared, be computer literate but don't be totally reliable. I am one of the last Gen X'ers. We were the video game people…we were the beginning of this stuff and guys 10 yrs younger than me that will make us obsolete if we are not careful but they will never make us obsolete if we aren't completely dependent on these things. We need to have a balance of knowledge and a balance of reference tools. Remember these are tools and that is the most impt of caution I can say about tech in future.

SW: So….We aren't getting rid of the docs.?

PG: Not in the next century…. These things are designed to make our lives easier not to replace what we do.

APPENDIX B

RURAL PHYSICIAN SURVEY MATERIALS

B.1 FIRST SURVEY REQUEST LETTER

March 30, 2009

Dear Doctor:

This survey, conducted in conjunction with the School of Public Health at the University of Pittsburgh, seeks to identify **physician perceptions and use of technology** in their individual office practices. In light of the newly signed government bill mandating increased technology in health care, this survey seems particularly timely as it explores the impact such things as the Internet, Electronic Medical Records (EMRs), Personal Digital Assistants (PDAs), and technology in general have on the practice of medicine.

Please note that your time and privacy are of utmost concern. This survey should only take about 10 -15 minutes to complete. Rest assured that the results of this survey will remain strictly confidential. No names are required and thus cannot be paired or associated in any way with any survey responses. Also, although the Conemaugh Health System courier system was used to distribute this survey, it will not be viewed by anyone associated with the hospital but will only be used for educational purposes at the University of Pittsburgh.

If you would like further information concerning this research or a copy of the results of this survey, please forward your questions directly to me through the Conemaugh Health System's courier service to my husband's office (J. Eric Wieczorek, MD 456 Locust Street, Sidman, PA 15904) or by mail to my Pitt Johnstown office (200A Biddle Hall, 450 Schoolhouse Road, Johnstown, PA 15904). You may also contact me directly by my cell (814-659-7821) or through email at SusanW@Pitt.edu.

Upon completion of this survey, please place it in a separate courier envelope, different from the one sent you in order to maintain your anonymity. Return the envelope to Susan M. Wieczorek, c/o Dr. J. Eric Wieczorek's Sidman office as soon as possible.

Thank you in advance for your cooperation, time, and serious consideration.

Sincerely,

Susan M. Wieczorek

B.2 RURAL PHYSICIAN SURVEY

Physician Perceptions and Usage of Technology Survey

The purpose of this research study is to determine to what extent physician perceptions affect their usage of "technology," defined as computers, Internet, Electronic Medical Records (EMRs), emails, e-scripts, and Personal Digital Assistants (PDAs). For this reason, I am surveying rural physicians of the Conemaugh Health System in the Johnstown region by asking them to complete a brief (approximately 15 minutes) questionnaire. If you are willing to participate, this questionnaire will ask about general practice information (e.g., type of medical practice, age of patients, number of years in practice) as well as your feelings and perceptions about the use of technology within your practice. There are no foreseeable risks associated with this project, nor are there any direct benefits to you. There will be no incentives given to participants. This is an entirely anonymous questionnaire, and your responses will not be identifiable in any way. All responses are confidential, and results will be kept under lock and key. Your participation is voluntary, and you may withdraw from this project at any time. This study is being conducted as part of a survey methods course requirement at the University of Pittsburgh. Questions may be forwarded to the researcher, **Susan Wieczorek**, at 814-659-7821.

General Practice Questions

Q-1 Which specialty area best describes your present, individual practice of medicine?
(Please check all that apply.)

1. ☐ Family Practice/General Medicine
2. ☐ Internal Medicine
3. ☐ Pediatrics
4. ☐ OB/GYN
5. ☐ Other Specialty: ____

Q-2 How long have you been practicing medicine (beyond your most recent residency program)?
(Please check one.)

1. ☐ Less than 5 years.
2. ☐ 5 to 10 years.
3. ☐ 11 to 20 years.
4. ☐ 21 to 30 years.
5. ☐ More than 30 years.

Q-3 How would you describe the size of your practice (not including Physician Assistants or Nurse Practitioners)? This would include all primary or specialty care physicians who work within the same office you do. *(Please check one.)*

1. ☐ Solo practitioner.
2. ☐ 2 to 3 physicians.
3. ☐ 4 to 5 physicians.
4. ☐ More than 5 physicians.

Q-4 What is your gender?

☐ Male.
☐ Female.

Q-5 Which percentage of your patient population represented each category within the past ye

_____% Under age 18.
_____% Born 1977-1990, Ages 18 to 32.
_____% Born 1965-1976, Ages 33-44.
_____% Born 1955-1964, Ages 45-54.
_____% Born 1946-1954, Ages 55-63.
_____% Born 1937-1945, Ages 64-72.
_____% Born 1936 or earlier, Age 73+.
_____ My patient population varies too much for me to make this estimate.

Technology Related Questions

Q-6 For what purpose(s) do *you or your staff* use the computer, Internet, and/or Personal Digital Assistants (PDAs) in your office practice? *(Check all that apply.)*

1. ☐ Billing purposes.
2. ☐ Patient scheduling.
3. ☐ Electronic-prescriptions (e-scripts).
4. ☐ Hospital record retrieval (lab reports, etc.).
5. ☐ Emails with other *physicians.*
6. ☐ Emails with *patients.*
7. ☐ Electronic Medical Records (EMRs).
8. ☐ Educational health materials from the Internet for *patient use.*
9. ☐ Educational health materials from the Internet for *personal use.*
10. ☐ Other:______________________________

Q-7 How would you best describe your *overall feelings* towards the use of technology (Computers, Internet, PDAs, EMRs, etc.) in each of the following two areas?
(Check one response for each item.)

	Against it	Moderately against it	Moderately for it	Totally for it
a. *Within* your medical practice	☐	☐	☐	☐
b. *Outside* the practice of medicine	☐	☐	☐	☐

Q-8 **In the past six months, how often have you *personally used* the following technology for *professional purposes*?** *(Check one response for each item.)*

	Never	Almost Never	Not Often	Some-times	Often	Very Often
a. Hospital record retrieval	☐	☐	☐	☐	☐	☐
b. Email to other physicians for professional reasons	☐	☐	☐	☐	☐	☐
c. Email to patients for professional reasons	☐	☐	☐	☐	☐	☐
d. E-prescriptions	☐	☐	☐	☐	☐	☐
e. Electronic Medical Records (EMRs)	☐	☐	☐	☐	☐	☐
f. Computer Internet research	☐	☐	☐	☐	☐	☐
g. PDAs as a research/reference tool	☐	☐	☐	☐	☐	☐
h. Internet to make investments	☐	☐	☐	☐	☐	☐
i. Internet to make purchases	☐	☐	☐	☐	☐	☐
j. Internet to file taxes	☐	☐	☐	☐	☐	☐

Q-9 **In the past six months, how often have you *personally used* the following technology for *non-work related purposes*?** *(Check one response for each item.)*

	Never	Almost Never	Not Often	Some-times	Often	Very Often
a. Emails for personal purposes	☐	☐	☐	☐	☐	☐
b. Computer Internet research	☐	☐	☐	☐	☐	☐
c. PDAs for fun/personal purposes	☐	☐	☐	☐	☐	☐
d. Electronic games	☐	☐	☐	☐	☐	☐
e. Internet to make purchases	☐	☐	☐	☐	☐	☐
f. Internet for driving directions	☐	☐	☐	☐	☐	☐
g. Internet to “Surf the Web”	☐	☐	☐	☐	☐	☐
h. Other	☐	☐	☐	☐	☐	☐

Q-10 How *many* of your *patients* do you think use the Internet for any of the following reasons?
(Check one response for each item.)

	None	Very Few	Some	Most	All	I Don't Know
a. To email doctor's office for appointment	☐	☐	☐	☐	☐	☐
b. To email doctor's office for prescriptions	☐	☐	☐	☐	☐	☐
c. To email the doctor for medical advice	☐	☐	☐	☐	☐	☐
d. To email friends in general	☐	☐	☐	☐	☐	☐
e. To web cam family and friends	☐	☐	☐	☐	☐	☐
f. To find health related information	☐	☐	☐	☐	☐	☐
g. To "surf the web" for fun	☐	☐	☐	☐	☐	☐
h. To play games	☐	☐	☐	☐	☐	☐
i. To pay bills	☐	☐	☐	☐	☐	☐
j. To do banking	☐	☐	☐	☐	☐	☐
k. To find driving directions	☐	☐	☐	☐	☐	☐
l. Other	☐	☐	☐	☐	☐	☐

Q-11 How often do your patients bring in to their appointments health-related materials from the Internet for you to review?

1. ☐ Never
2. ☐ Sometimes
3. ☐ Often
4. ☐ Very often

Q-12 How do you feel about patients bringing in health related materials that they found from the Internet?

1. ☐ I am totally against it.
2. ☐ I am moderately against it.
3. ☐ I am moderately for it
4. ☐ I am totally for it

Q-13 Do you ever encourage your patients to use the Internet to seek medical information?

☐ Yes
☐ No

Q-14 What is your overall feeling about the use of Electronic Medical Records (EMRs) in offices today?

1. ☐ I am totally against it.
2. ☐ I am moderately against it.
3. ☐ I am moderately for it
4. ☐ I am totally for it

Q-15 How likely will you be to adapt full-scale Electronic Medical Records (EMRs) by 2014 in each of the following cases? *(Please check one response for each item.)*

	Not likely at all	Somewhat likely	Moderately likely	Very likely	N/A I Have already adopted
a. If there are *no* government mandates	☐	☐	☐	☐	☐
b. If there are *no* monetary incentives	☐	☐	☐	☐	☐
c. If insurance companies give incentives	☐	☐	☐	☐	☐
d. If technology overall improves	☐	☐	☐	☐	☐
e. If EMRs improve patient relationships	☐	☐	☐	☐	☐
f. If EMRs improve patient safety	☐	☐	☐	☐	☐
g. If EMRs save time for physicians	☐	☐	☐	☐	☐
h. If EMRs are secure from hackers	☐	☐	☐	☐	☐
i. If technical upgrades do not interfere with the overall office efficiency	☐	☐	☐	☐	☐

Electronic Medical Record Assessment

Q-16 Please rate the use of Electronic Medical Records (EMRs) in the practice of medicine in each of the following areas. Please circle the number that best represents how much each factor decreases or increases as a result of using EMRs. *(Please check the number that best describes your response in each row.)*

	Greatly Decreases 1	2	3	4	5	6	7	8	Greatly Increases 9	10
a. Quality of patient care	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
b. Amount of patient satisfaction	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
c. Amount of time spent with the patient	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
d. Amount of knowledge the patients have about their own health	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
e. Amount of participation the patients have in their own health management	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
f. Amount of cost incurred per patient visit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
g. Risk of security issues and breach of information (patient privacy)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
h. Possibility of system failures and/or loss of records	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
i. Ability to locate and retrieve information	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
j. Amount of discrimination against patients who cannot afford or use the Internet	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
k. Amount of insurance fraud and/or charge errors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
l. Ability to customize each office practice according to their particular needs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Thank you very much for your time and thoughtful input.

Please remember to return the survey in an inter-departmental folder to Susan Wieczorek c/o J. Eric Wieczorek, MD 456 Locust Street, Sidman, PA 15955.

Please feel free to make additional comments in the area below concerning this survey or the topic of technology in medicine in general. Your thoughts are appreciated!

B.3 SECOND SURVEY REQUEST LETTER

April 13, 2009

Dear Doctor:

This serves as a friendly reminder concerning the "Physician Perception and Uses of Technology" survey I sent out to you on March 30, 2009 from the School of Public Health at the University of Pittsburgh.

Since the survey was sent anonymously, I have no way of knowing who has or has not responded. To those who have, I thank you most sincerely for taking the time and effort to fill out the questionnaire in such a conscientious manner. To those who have not, I ask that you please take the 10 to 15 minutes to fill out the survey and to return it to me as soon as possible.

If you need an additional survey copy, please call the office of J. Eric Wieczorek, MD at 814-487-5721, call my cell at 814-659-7821, or email me at SusanW@Pitt.edu.

Again, I thank you for your time and thoughtful response to this important research in rural medicine.

Sincerely,

Susan M. Wieczorek

APPENDIX C

CRITICAL INCIDENT TECHNIQUE (CIT) SURVEY

Please note: The Letterhead of the University of Pittsburgh was used.

Doctor-Patient Electronic Communication

General Research Purpose

The purpose of this research study is to identify specific examples of outstandingly effective and outstandingly ineffective electronic interactions between patients and doctors. Electronic communication refers to any time you communicate directly with your doctor using such things as email, text messaging, blogging, FaceBook, MySpace, Twitter, web pages, or patient portals. It is to be noted that **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.** You will be asked to discuss in writing your experience communicating electronically between you and your own doctor, between you and a family member's doctor, or between you and a friend's doctor. If you have not communicated electronically with a doctor, you are asked to comment on how you *think* such communication should be conducted in an effort to reach the above stated goal.

You along with approximately 125 Engineering students and 580 Introduction to Psychology undergraduates from the University of Pittsburgh at Johnstown are being asked during class to complete this brief (approximately 10-15 minute) questionnaire concerning your use of electronic communication between you and a doctor. If you have communicated on behalf of your own medical care or the care of a friend or family member who you are representing, you are to respond to pages 2 and 3. If you have not had experience communicating electronically with a doctor, you are asked to respond to pages 4 and 5. (See italics below.)

There are no foreseeable risks associated with this project nor are there any direct benefits to you. There will be no incentive for completing this form. Cooperation, however, is greatly appreciated. This is an entirely anonymous questionnaire, and so responses will not be identifiable in any way. Please do not place your name anywhere on this form. Likewise, you should not indicate in writing or orally any names of patients, doctors, or anyone else. Results of this survey will be kept under lock and key and then destroyed upon completion of this study. Participation is voluntary, and the option is given to withdraw from this project at any time. This study is being conducted by Susan M. Wieczorek, Communication Faculty Member at the University of Pittsburgh at Johnstown. Susan may be reached at 814-659-7821 or SusanW@Pitt.edu for comments or the results of this study.

Note: Please fill in each space of this survey carefully and thoroughly. If you do not understand a question feel free to make notations in the margins or ask the administrator of this survey. When you finish with your booklet, please hand it in and wait to discuss any questions you might have. There are no right or wrong answers.

*If you **have** communicated with your doctor electronically fill out **pages 2 and 3**.*
*If you **have never** communicated with your doctor electronically, fill out **pages 4 and 5**.*
Please fill out this page ONLY if you have communicated with a doctor electronically.
If not, please go to page four.

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.

Think about the last time you communicated electronically with your doctor that was **outstandingly effective** in achieving the above stated goal. Describe the situation.

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.)

On whose behalf were you communicating with the doctor?
Yourself A Family Member A Friend
Other (Please explain):____
Circle which type of electronic communication(s) you used in this interaction.
Email Text Message Blog FaceBook MySpace Twitter Patient Portal Do Not Know
Other (Please describe):____
Circle which medical specialty best describes the doctor with whom you communicated.
Family Practice Pediatrics Obstetrics/Gynecology Surgery Psychiatry Do Not Know
Other (Please describe):____
Circle which response best describes the location in which this *doctor* practices.
Rural Area Suburban Area Urban Area Do Not Know
Other (Please describe.):____

Please Continue to the Page Three.

Please fill out this page ONLY if you have communicated with a doctor electronically.
If not, please go to page four.

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.

Think about the last time you communicated electronically with your doctor that was **outstandingly ineffective** in achieving the above stated goal. Describe the situation.

Tell exactly what your doctor did that indicated to you that this was an **outstandingly ineffective** means for achieving the above stated goal. (Feel free to use the back of this sheet for additional comments.)

On whose behalf were you communicating with the doctor?
Yourself A Family Member A Friend
Other (Please explain):____
Circle which type of electronic communication(s) you used in this interaction.
Email Text Message Blog FaceBook MySpace Twitter Patient Portal Do Not Know
Other (Please describe):____
Circle which medical specialty best describes the doctor with whom you communicated.
Family Practice Pediatrics Obstetrics/Gynecology Surgery Psychiatry Do Not Know
Other (Please describe):____
Circle which response best describes the location in which this *doctor* practices.
Rural Area Suburban Area Urban Area Do Not Know
Other (Please describe.):____

You Have Now Completed the Survey. Additional Comments May be Made on the Back of This Sheet. THANK YOU VERY MUCH for your time and conscientious response!

Please fill out this page ONLY if you have NEVER communicated with a doctor electronically.
If you have communicated with your doctor electronically, please go back to page two.
If not, imagine how you think this communication SHOULD occur.

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.

Imagine communicating electronically with your doctor in an **outstandingly effective** manner in achieving the above stated goal. Describe the situation.

Tell exactly what you think your doctor might do to make this interaction **outstandingly effective** in achieving the above stated goal. (Feel free to use the back of this sheet for additional comments.)

On whose behalf did you imagine you were communicating with the doctor?

Yourself A Family Member A Friend

Other (Please explain):____

Circle which type of electronic communication(s) you imagined using in this interaction.

Email Text Message Blog FaceBook MySpace Twitter Patient Portal Do Not Know

Other (Please describe):____

Circle which medical specialty best describes the doctor with whom you imagined communicating.

Family Practice Pediatrics Obstetrics/Gynecology Surgery Psychiatry Do Not Know

Other (Please describe):____

Circle which response best describes the location in which the *doctor* you imagined practices.

Rural Area Suburban Area Urban Area Do Not Know

Other (Please describe.):____

Please Go to the Page Five.

Please fill out this page ONLY if you have NEVER communicated with a doctor electronically.

If you have communicated with your doctor electronically, please go back to page two.

If not, imagine how you think this communication SHOULD occur.

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.

Think about the last time you communicated electronically with your doctor that was **outstandingly ineffective** in achieving the above stated goal. Describe the situation.

Tell exactly what you think your doctor might do to make this interaction **outstandingly ineffective** in achieving the above stated goal. (Feel free to use the back of this sheet for additional comments.)

On whose behalf did you imagine you were communicating with the doctor?
Yourself A Family Member A Friend
Other (Please explain):____
Circle which type of electronic communication(s) you imagined using in this interaction.
Email Text Message Blog FaceBook MySpace Twitter Patient Portal Do Not Know
Other (Please describe):____
Circle which medical specialty best describes the doctor with whom you imagined communicating.
Family Practice Pediatrics Obstetrics/Gynecology Surgery Psychiatry Do Not Know
Other (Please describe):____
Circle which response best describes the location in which the *doctor* you imagined practices.
Rural Area Suburban Area Urban Area Do Not Know
Other (Please describe.):____

You Have Now Completed the Survey.
Additional Comments May be Made on the Back of This Sheet.
THANK YOU VERY MUCH for your time and conscientious response!

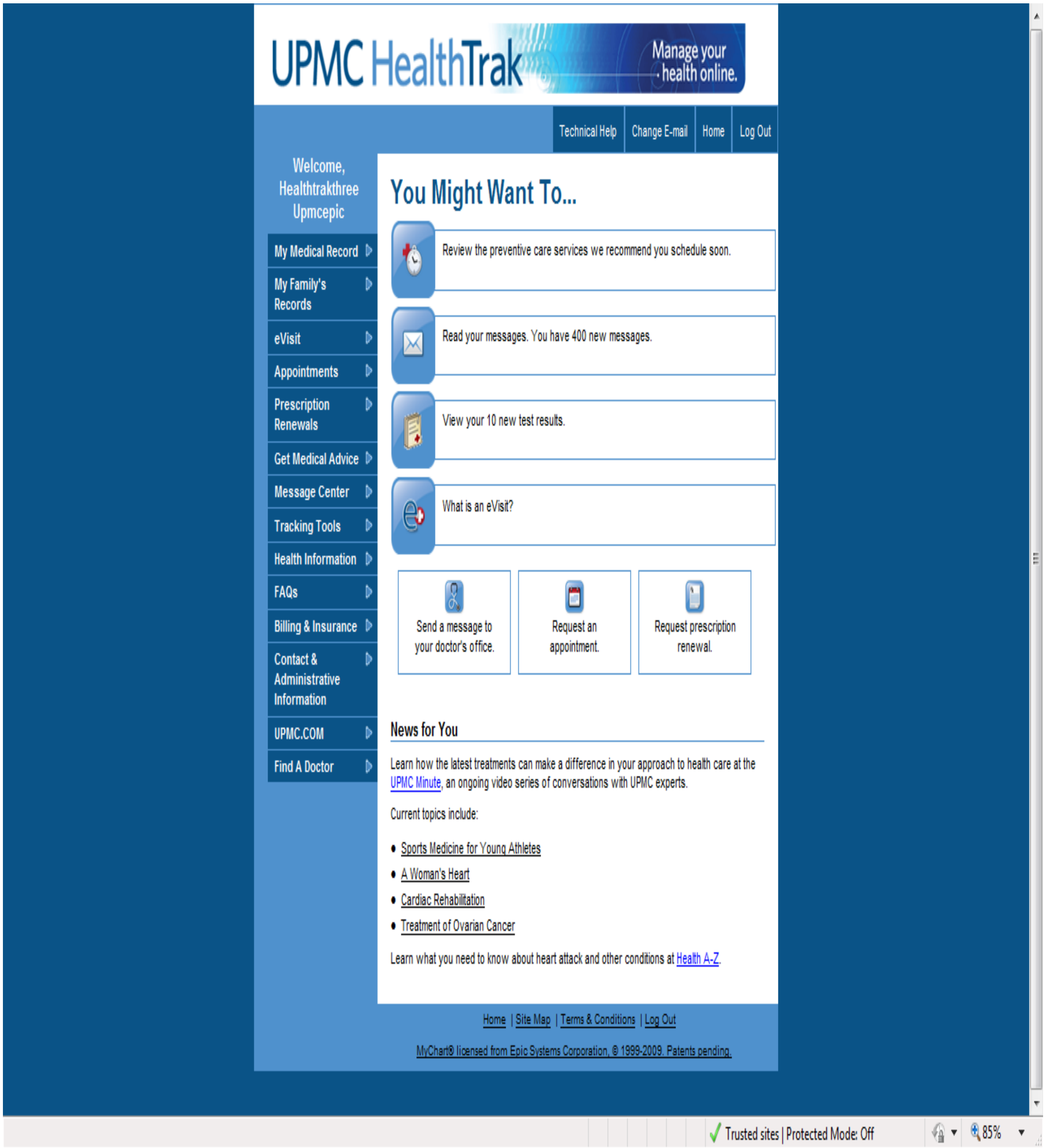
APPENDIX D

URBAN PHYSICIAN AND PATIENT SURVEY STUDIES

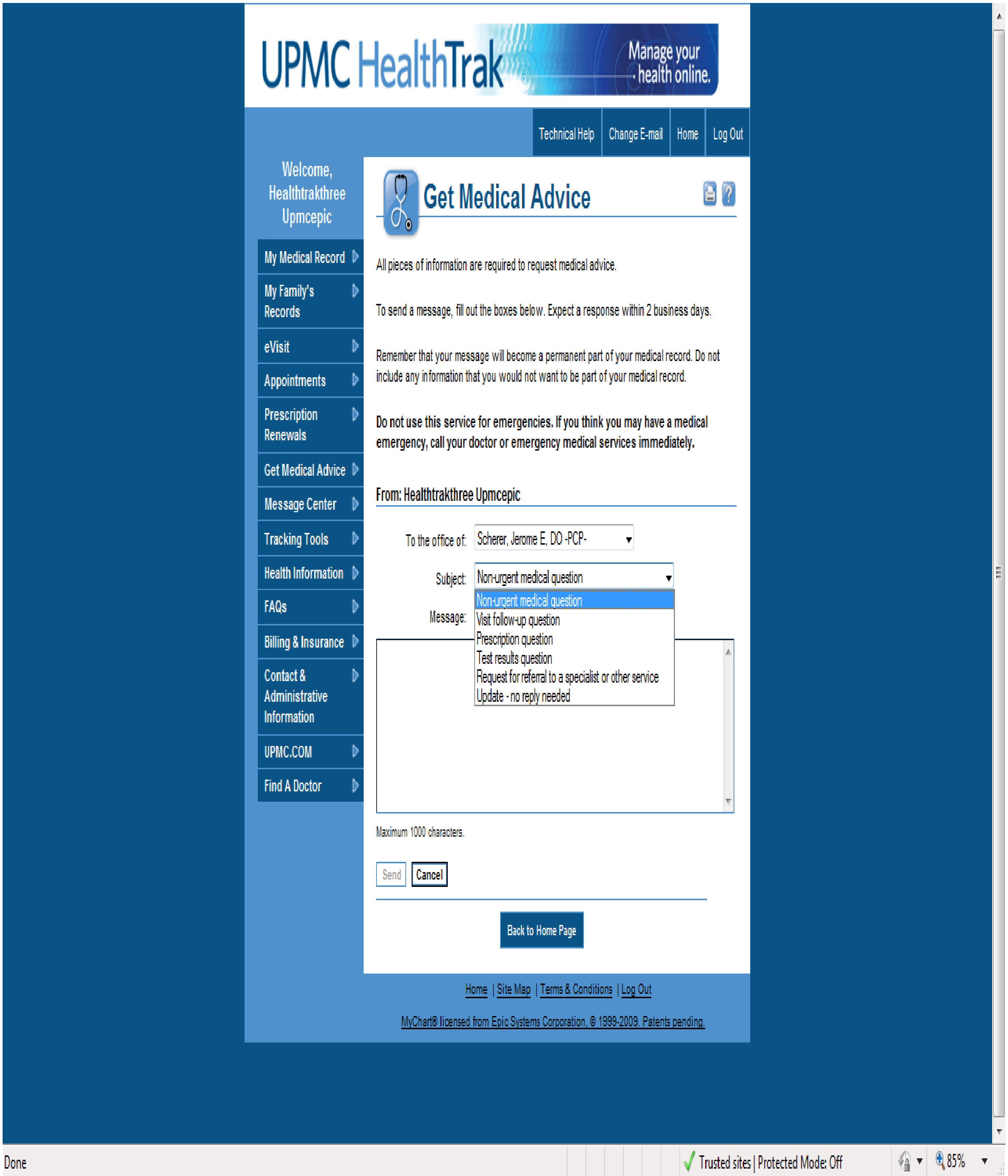
D.1 HEALTHTRAK SCREEN SHOTS

Login Screen

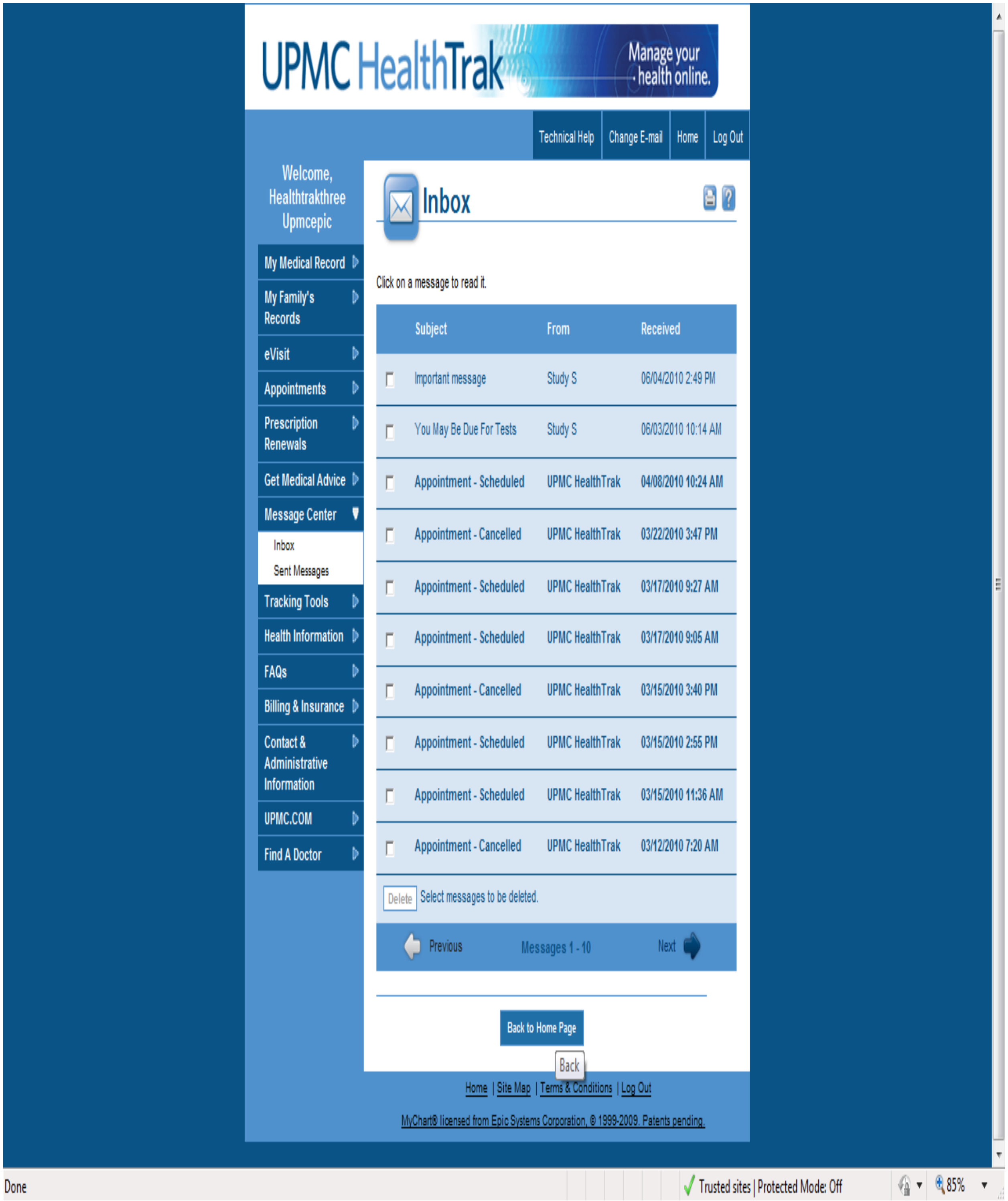
First Page View after Login Screen



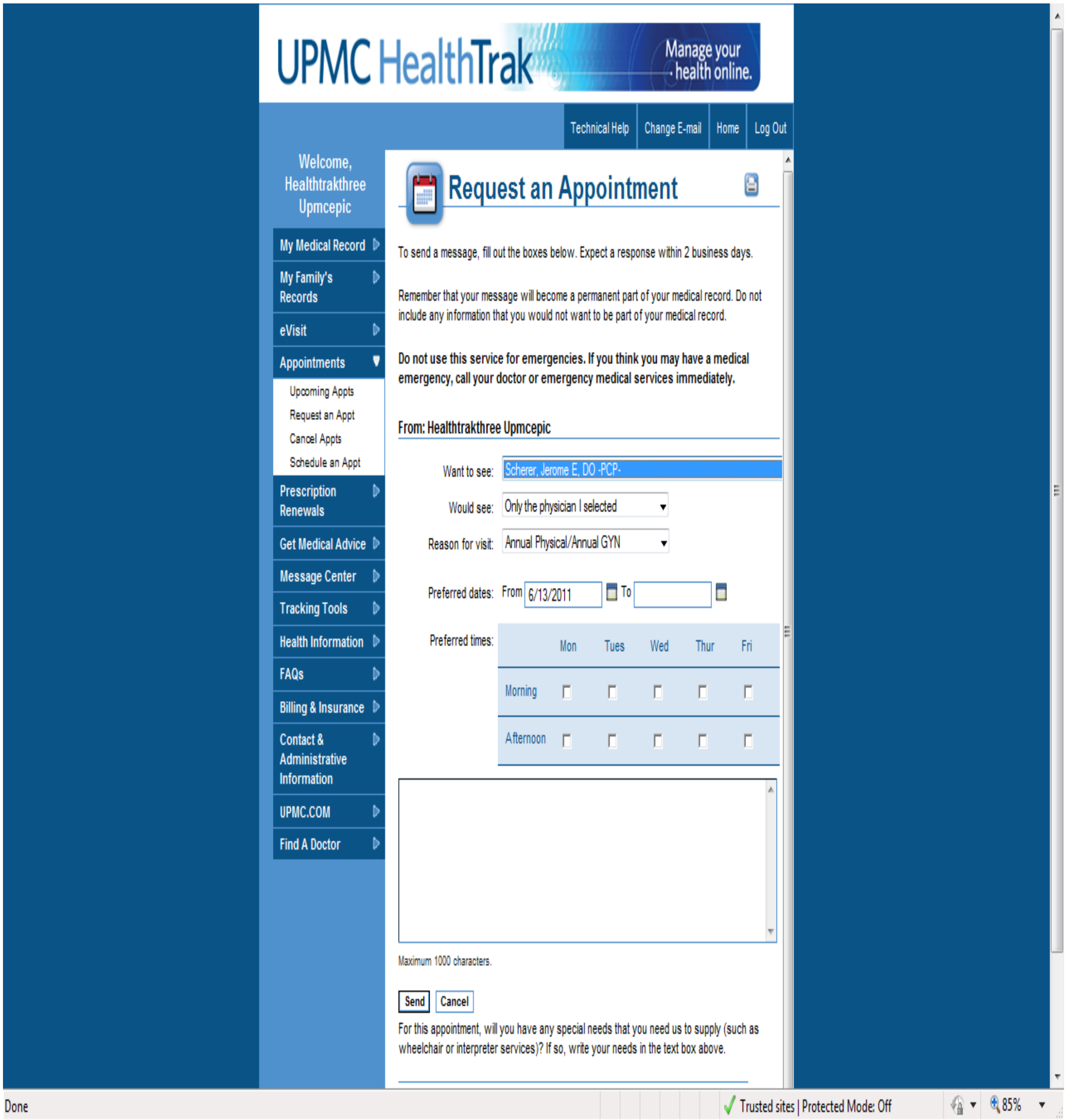
After “Send Message to Your Doctor” Screen



Electronic Messaging Screen



eVisit Screen



D.2 SURVEY RECRUITMENT LETTERS AND PERMISSION FORM

D.2.1 Patient Letters/Form: Quality Improvement Review Screening Tool

Quality Improvement Review Screening Tool

08/09

UPMC Health System
Quality Improvement Projects vs. Research Studies
Quality Improvement Review Screening Tool

Date of Submission: 10/11/10

Title of Project: Patient Satisfaction with UPMC HealthTrak in General Internal Medicine

Sponsor: Gary Fischer, MD Department: General Internal Medicine

Co-Sponsors:

Facility (UPMC entity): MUH

Anticipated Start Date: 11/1/10

Anticipated End Date: 3/1/11

Estimated Duration of Entire Project: 6 months

Referred for QI review by IRB staff YES NO x

---

1. Goal(s) of project:

1. Determine patient view of HealthTrak in terms of its usefulness as a means of communication with our office.

2. Determine how patients view HealthTrak compared to other methods of communication for different situations.

4. Determine if our office (physicians and staff) are satisfying patients in terms of our responsiveness and answers to our questions.

5. Determine if patients consider electronic messaging within HealthTrak as beneficial to their overall health.

2. Is there a commitment to implementing a corrective plan based on the outcomes of the project (check one**)?**

No ☐ Yes x

3. Is the project being funded by an external agency (check one**)?**

No x Yes ☐ if yes, specify agency**:**

4. What is the primary intent of the project (answer one):

Publication ☐ or Quality Improvement x

What improvements do you hope to implement in the local environment?

1. **If we learn that there are deficiencies in our responsiveness, we will create an action plan to correct then.**
2. **The information will help us to learn the situations in which we should encourage HT use, and the situations in which we should use other forms of communication.**
3. **Based on how effective patients perceive electronic messaging to be, we can determine how many resources (time, effort) we should spend in promoting its use.**

---

4. **If patient data is being collected, please indicate how data is going to be collected (**check all that apply and Circle the Database being used**):**

☐ **Chart review through medical records (***i.e.,***Horizon Patient Folder(HPF) and hardcopy records)**

X Chart review through electronic medical records (*i.e,* Powerchart™,MARS, Stentor™ OR Other – please specify database): Demographic data and email addresses (to send survey) for GIMO HealthTrak uses who will be surveyed.

☐ Data collection from the UPMC Network Cancer registry database.(If using other registry database - Please specify database):

x Patient interviews/observations Web-based survey.

Please attach a sample data collection form.

All patient identifiable data collected and stored for this study needs to comply with UPMC Policy HS MR1000 regarding the privacy and security of clinical data.

6. Provide a brief summary (one page) or abstract of your proposed project and attach it to this page. See attached.

7. If the project involves a therapeutic intervention, is the intervention to be delivered in a blinded fashion? No ☐ Yes ☐ NA

8. Does the project involve "withdrawing" or holding back any needed and generally accepted treatments for the patients' condition?:

No x Yes ☐

9. Does the project involve prospective assignment of patients to different procedures or therapies based on predetermined plans such as randomization?

No x Yes ☐

10. Is the project evaluating a drug, biologic or device which is not currently FDA approved (*i.e.*, off label use)? No x Yes ☐

11. Are patients involved in the project exposed to additional risks or burdens (ie. other than the completion of patient satisfaction surveys) beyond standard clinical practice?

No x Yes ☐

12. What outcomes are being evaluated?

Satisfaction.

Perceived Efficacy

13. Describe briefly why you think this is a QI project and not a research study:

We are collecting information on satisfaction and perceived efficacy from our own patients. We are not subjecting them to any intervention and we are not providing different treatments to different groups. The information obtained will help us better understand how patients are using HealthTrak in our practice, and how they perceive its usefulness and effectiveness. It may help us determine which patients are more likely to like/use HealthTrak, and which medical situations are best suited to electronic communication through HealthTrak, as opposed to other forms of communication.Dr. Fischer, who is supervising this project, is medical director of the outpatient GIM clinic and is in a position to make changes based on the findings of this survey. For these reasons, we believe that this is QI, even though a communication doctoral student who is working with us will use the information obtained as part of her graduate dissertation.

- -

For completion by QI Review Committee designee: This section is for committee use only.

Date of Review: **Date Approved:**

Approved as Quality Improvement Project -

Agree:

Disagree:

Date to be presented to Total Quality Council:

Prospective date for feedback to TQC on outcomes:

Comments:

QI Review Number:

Completed by:

Please send this form and all back-up documents to Dr. Jegasothy

Name:	Jegasothy, Juliet S
University relationship:	UPMC
UPMC Office phone:	(412) 454-7940
UPMC Email:	jegasothyj@upmc.edu

D.2.2 Patient Letters/Form: Quality Improvement Permission

Rationale for this Quality Improvement Project

The notion of electronic messaging has been researched extensively for its use and applicability in providing yet another method of communication with physicians to achieve optimum patient care. The Institute of Medicine in 2001 reported the following:

- Patients should receive care whenever they need it and in many forms, **not just face-to-face visits**.
- Health care systems must be responsive at all times and access to care should be provided over the Internet, by telephone, and by other means in addition to in-person visits.
- The key to a trusting, effective relationship involves **multiple levels of communication**, including but not limited to email.

With this in mind, it is the purpose of the UPMC HealthTrak portal to provide this electronic messaging medium to gain a fully "trusting, effective relationship" with their patients. How well this service is provided depends upon our ability to measure our present success against our previous unpublished studies.

More specifically, a series of unpublished studies had tested satisfaction levels and usage patterns of patients who navigated UPMC HealthTrak. The first 2004 survey tested for basic satisfaction and navigation of the portal in communicating with the healthcare professionals. Likert scale questions indicated patients were generally satisfied while qualitative questions suggested some areas warranting improvement within the system.

A second study yielded preliminary findings through focus groups and related surveys conducted with the help of The InforMedx Group Healthcare Solutions (between 2007 and 2008). This study's population included UPMC HealthTrak healthcare providers, office staff, patient users, and patient non-users. Generally, users of the electronic messaging service were satisfied with the system but did suggest some areas for improvement.

Although the results of these studies were helpful, after nearly seven years and increased national attention to the overall use of electronic messaging in healthcare, a comparison is warranted to see whether or not patient perceptions of the electronic medical system continue to be deemed satisfactory. Likewise, a more systematic method of analysis is needed as proposed in this current study. It is hoped that ideally, patient care may be improved as a result of information gained through comparing previous and current, more systematically designed research studies.

Procedures:

We will examine patient perceptions of electronic messages with their physicians within the secured patient portal of the UPMC HealthTrak system. Approximately 3,000 patients from the University of Pittsburgh Physicians of the General Internal Medicine Clinic (UPP-GIM, Oakland) at UPMC Montefiore Hospital will participate in this online survey. Prior to survey distribution, the survey instrument will be piloted with at least ten colleagues within the UPMC/Pitt system. It will then be distributed online to the patients from a UPMC service email account. In the email, the patients will be told that a strict adherence to anonymity will be kept with no chance for patient personal emails to be connected with the completed survey information. They will also be told that they cannot respond to the survey twice due to the design of the survey program. All responses will be collected through the use of a SurveyMonkey link supplied in the email message. Since there will be no way of identifying which individual patients responded and which did not, a first and second reminder will be sent out via email in one week intervals to all patients.

Data will be collected and analyzed using an 18-question, Likert scale questionnaire with no open-ended questions. This assures that patients cannot supply any reference to their own names or the names of any other person within the study. This is done as an added precaution to assure the privacy of the patients and physicians involved in the electronic messaging service.

Analysis of data will occur after the three week period of data collection. SPSS, ANOVA and similar programs will be used to help analyze the data. The results are hoped to provide increased insight into the effectiveness and/or problems associated with physician/patient electronic communication within UPMC HealthTrak. We expect that our findings will help GIM-Oakland determine how best to promote the various uses of HealthTrak to our patients and to uncover deficiencies in our usage of HealthTrak that may need remediation.

D.2.3 Patient Letters/Form: Initial Participation Request to Patients

Dear Patients:

You are invited to complete a survey for patients who use UPMC HealthTrak to communicate with their doctor. We want to learn about your experience in using UPMC HealthTrak so we can best meet your needs as our patient. Since you have been identified as someone who has used UPMC HealthTrak in the past, we feel you would be an excellent person to help us to improve our service to you.

The survey should take no more than 15 minutes to complete. Your answers will not be linked to your name or to your email address. We will have no way of matching your name with your responses. The survey will be completely anonymous.

It will be most helpful to us if you complete this survey within 2 days.

To enter the survey, click this link, or copy and paste it into your web browser:

http://www.surveymonkey.com/s/patient_upmc_electronic_messaging_survey

If you wish to contact us, please do not reply to this email address (surveys@upmc.edu). Since this account is only used for sending out this survey, it is possible that no one will read your message. However, if you do have any questions, please send a HealthTrak message to the office. Write “To Dr. Fischer” in the reason for message. You may also call me at the UPP General Internal Medicine office (412-692-4888).

Thank you for your time,

Gary S. Fischer, MD
Medical Director, Ambulatory Services
University of Pittsburgh Physicians- General Internal Medicine
MUH W-920
200 Lothrop St
Pittsburgh, PA 15213

D.2.4 Patient Letters/Form: First Reminder Letter to Patients

Dear Patients:

Thank you to all of you who have already completed our recent survey of patients who use UPMC HealthTrak for electronic communication with their physicians. Since we have no way of knowing who did or did not fill out the survey, we are sending this reminder to everyone in hopes of hearing from as many of you as possible.

We want to know about your experince using UPMC HealthTrak electronic communication with your physician. As we approach our seventh year of electronic messaging with our patients, we seek your views on the overall use, effectiveness, satisfaction, and level of patient-centered care provided by this medium. You have been chosen for this survey because you are a patient in UPP-General Internal Medicine who participates in UPMC HealthTrak.

We expect that the survey will take no more than 15 minutes to complete. Remember, your answers will not be linked to your name or to your email address, so we will have no way to identify who provided which responses. We do not anticipates any risks to you from completing this survey, and there is no compensation to you, but our gratitude.

Completion of this survey is, of course, completely voluntary. It will be most helpful to us if you fill it out within 2 days.

To enter the survey, click this link:
http://www.surveymonkey.com/s/patient_upmc_electronic_messaging_survey

Finally, please do not respond directly to this email (surveys@upmc.edu). It is coming from an unmonitored account. It is possible that no one will read your message. However, if you have any questions, please email me at fischerg@msx.upmc.edu or call the University of Pittsburgh General Internal Medicine Center and ask for me at 412-692-4888.

Thank you for your time,

Gary S. Fischer, MD
Division of General Internal Medicine
University
MUH W-920
200 Lothrop St
Pittsburgh, PA 15213

D.2.5 Patient Letters/Form: Second Reminder Letter to Patients

Dear Patients:

To all who have responded to our UPMC HealthTrak survey on electronic messaging with physicians, thank you! We very much appreciate your time and effort in helping us improve our ability to care for our patients.

Since we have no way of knowing who has or has not completed the survey sent to you earlier, we again are asking for those who have not yet responded, to please fill out this survey as soon as possible. This will be our last request for participation in the survey.

We want to know about your experince using UPMC HealthTrak electronic communication with your physician. As we approach our seventh year of electronic messaging with our patients, we seek your views on the overall use, effectiveness, satisfaction, and level of patient-centered care provided by this medium. You have been chosen for this survey because you are a patient in UPP-General Internal Medicine who participates in UPMC HealthTrak.

We expect that the survey will take no more than 15 minutes to complete. Remember, your answers will not be linked to your name or to your email address, so we will have no way to identify who provided which responses. We do not anticipates any risks to you from completing this survey, and there is no compensation to you, but our gratitude.

Completion of this survey is, of course, completely voluntary. It will be most helpful to us if you fill it out within 2 days.
To enter the survey, click this link:
http://www.surveymonkey.com/s/patient_upmc_electronic_messaging_survey

Finally, please do not respond directly to this email (surveys@upmc.edu). It is coming from an unmonitored account. It is possible that no one will read your message. However, if you have any questions, please email me at fischerg@msx.upmc.edu or call the University of Pittsburgh General Internal Medicine Center and ask for me at 412-692-4888.

Thank you for your time,

Gary S. Fischer, MD
Division of General Internal Medicine
University of Pittsburgh Medical School
MUH W-920
200 Lothrop St
Pittsburgh, PA 15213

D.2.6 Physician Letters: Pilot Letter to Independent Group of Physicians

(Direct Email from Fischer to Several Physicians)

From: Fischer, Gary
Sent: Monday, December 06, 2010 8:10 AM
To: XXX, YYY MD; ZZZ,PPP; LLL, MMM
Cc: 'Susan Wieczorek'
Subject: Please help me pilot a survey

Susan M. Wieczorek a doctoral student in Communication is conducting a survey with me on the docs in my division (General Internal Medicine) about their use and perceptions regarding HealthTrak messaging.

We would like a few doctors to pilot the survey before we 'unleash' it on our participants.

The survey may take up to 10 minutes or so – although I don't think it will.

Could you please take a few minutes to complete it and then send me an email with suggestions, if any, and how long you think it took?

Your answers can be made up if you want, but in any event, will be anonymous because the survey does not collect identifying information.

Here is the link to the survey: http://www.surveymonkey.com/s/RGK29KG

Thanks!!

Gary S. Fischer, MD
Associate Professor of Medicine
University of Pittsburgh
412-692-488

This E-Mail may contain confidential information of the sending organization. Any unauthorized or improper disclosure, copying, distribution, or use of the contents of this E-Mail and attached document(s) is prohibited. The information contained in this E-Mail and attached document(s) is intended only for the personal and confidential use of the recipient(s) named above. If you have received this communication in error, please notify the sender immediately by E-mail and delete the original E-Mail and attached document(s) original E-Mail and attached document(s).

D.2.7 Physician Letters: Physician Pilot Recommendations

Response One

From: ZZZZ, LLLL.
Sent: Monday, December 06, 2010 6:33 PM
To: Fischer, Gary; BBBB, ZZZ MD; MMM, QQQ
Cc: 'Susan Wieczorek'
Subject: RE: Please help me pilot a survey

I just took it and yes it was 9 minutes. I think it would be very interesting to see the results. A question that could or should be added is one asking them how long they have been utilizing an electronic medical record. Don't you think that has any impact on many aspects?

Response Two

From: WWWW, DDDD MD
Sent: Monday, December 06, 2010 8:33 AM
To: Fischer, Gary; XXX, JJJJ; GGGG, RRRRRR
Cc: 'Susan Wieczorek'
Subject: RE: Please help me pilot a survey

I completed my survey overall good questions 'moderately' clear in their meaning.

I am interested in why a 6 point scale?

I would recommend in question #9 please state to whom the question is directed; cost effectiveness for the patient or the physician?

In this question I wanted to rank in decreasing order the effectiveness; most effective for the physician is face to face, 2nd electronic and third the telephone. I do understand this is the limit of survey monkey.

XXXX

Response Three

From: Fischer, Gary
Sent: Monday, December 06, 2010 8:33 AM
To: XXX, JJJJ; GGGG, RRRRRR
Cc: 'Susan Wieczorek'
Subject: RE: Please help me pilot a survey

The 6-point scale was thought to provide more valid psychometric data. thanks allot for doing this.

D.2.8 Physician Letters: Preliminary Letter to Physicians

Dear Colleagues:

Within the next week, a brief survey concerning your participation in the UPMC HealthTrak physician/patient messaging services will be distributed by the UPP General Internal Medicine Clinic to your UPMC CONNECT account. A SurveyMonkey link will appear in an email. Simply click on the link and respond with your assessment of the overall use, efficacy, satistfaction, and level of patient-centered care provided by this medium. Please note that in an effort to assure your anonymity, email addresses will not be matched with your responses.

As you may recall, in 2004 an earlier unpublished survey assessed patient/ physician ease of navigation through and satisfaction with the new electronic messaging service. Later, a second preliminary study was also done on this group with the help of The InforMedx Group Healthcare Solutions (between 2007 and 2008). This study design used focus groups and surveys for UPMC HealthTrak healthcare providers, office staff, patient users, and patient non-users. Results helped assess overall physician/patient satisfaction but were not done specifically on how well the physicians perceived the effectiveness of this medium for patient care.

Therefore, as we are approaching our seventh year of electronic messaging with our patients, it is time for an expanded, comparative survey designed to further assess our perceived effectiveness, ease of use, and satisfaction with the system. A comparable survey will also be distributed to patients as well through Quality Improvement. The intent is to gain feedback on what is and is not working, how people view the effectiveness of this medium, and how well we are meeting the healthcare needs of our patients.

Please complete this upcoming survey as quickly as possible. Trust that your time and effort in doing so is most appreciated.

Sincerely,

Gary Fischer, MD

D.2.9 Physician Letters: Formal Participation Request Letter to Physicians

Dear Colleagues:

We are conducting a research study in which we are surveying all physicians in UPP-General Internal Medicine in Oakland about electronic communication with patients using UPMC HealthTrak. Now that we are approaching our seventh year of electronic messaging with our patients, we are interested in your assessment of the overall use, efficacy, satisfaction, and level of patient-centered care provided by this medium. You have been chosen for this survey because you are a physician in UPP-General Internal Medicine who participates in UPMC HealthTrak.

We expect that the survey will take no more than 15 minutes to complete. Your answers will not be linked to your name or to your email address, so we will have no way to identify who provided which responses. We do not anticipates any risks to you from completing this survey, and there is no compensation to you, but our gratitude.

Completion of this survey is, of course, completely voluntary. It will be most helpful to us if you complete it within 2 days.

To enter the survey, click this link:
http://www.surveymonkey.com/s/UPPGIMphysiciansurvey

If you have any questions, please email me or call me at 412-692-4888.

Thank you for your time,

Gary Fischer, MD

D.2.10 Physician Letters: First Reminder Letter to Physicians

Dear Colleagues:

Thank you to all of you who have already responded to our physician/patient electronic messaging survey. If you have not yet responded, please click on the following link to complete the survey as soon as possible: http://www.surveymonkey.com/s/UPPGIMphysiciansurvey

Since this survey is anonymous, we have no way of knowing who has or has not responded; therefore, we are sending this out again to everyone as a courteous reminder.

Remember that the intent of this survey is to understand better what may or may not be working, how people view the effectiveness of this medium, and how well we are meeting the healthcare needs of our patients.

Please complete this survey within the next two days if possible.

With thanks,

Gary Fischer, MD

D.2.11 Physician Letters: Second Reminder Letter to Physicians

Dear Colleagues:

Many thanks to all of you who have responded to our physician/patient electronic messaging survey . If you have not already completed the survey, we are sending this second and final reminder for you to please click on the following link to complete the survey as soon as possible:

http://www.surveymonkey.com/s/UPPGIMphysiciansurvey

Remember that since this survey is anonymous, we have no way of knowing who has or has not responded and, therefore, we are sending this out again to everyone as a courteous reminder.

The intent of this survey is to better understand what may or may not working, how people view the effectiveness of this medium, and how well we are meeting the healthcare needs of our patients. We would like to get the opinions of all GIM physicians who communicate with their patients using HealthTrak. Your response to this second reminder will help us achieve this goal.

Please complete this survey as quickly as possible. Trust that your time and effort in doing so is most appreciated.

Sincerely,

Gary Fischer, MD

D.3 SURVEY COPIES

D.3.1 Patient Survey

Physician/Patient Electronic Messaging: Patient Survey

1. Patient Survey on Electronic Messaging with Physicians

As a participant in the patient/physician electronic messaging service through UPMC HealthTrak, you are ideally qualified to evaluate the effectiveness of this method of communication. This brief online survey is designed to measure how well this service is meeting your healthcare needs. Please note that this questionnaire only refers to your online electronic messaging with physicians and not to eVisits (which are billed to you and/or your insurance company).

The information you provide will remain strictly confidential. Therefore, please do not include your name or the name of any other person in your responses.

*** 1. How often do you send electronic messages to your physician using HealthTrak?**

- ◯ Rarely
- ◯ Occasionally
- ◯ Frequently

*** 2. How easy do you feel it is to send electronic messages to your physician through the HealthTrak website?**

- ◯ Extremely Difficult
- ◯ Moderately Difficult
- ◯ Somewhat Difficult
- ◯ Somewhat Easy
- ◯ Moderately Easy
- ◯ Extremely Easy

*** 3. How helpful do you feel the majority of electronic messages from your physician are in improving your overall health?**

- ◯ Extremely Unhelpful
- ◯ Moderately Unhelpful
- ◯ Mildly Unhelpful
- ◯ Mildly Helpful
- ◯ Moderately Helpful
- ◯ Extremely Helpful

Physician/Patient Electronic Messaging: Patient Survey

*** 4. How promptly have your electronic messages been responded to by your physician?**

- ◯ Never Received a Response
- ◯ Waited Over a Week for a Response
- ◯ Received a Response within a Week
- ◯ Received a Response within Two Days
- ◯ Received a Response within 24 Hours
- ◯ Received a Response almost Immediately

*** 5. How often were your health concerns resolved through the electronic message exchanges without your having to be directed to come in to see the physician for a face-to-face visit?**

- ◯ Never
- ◯ Rarely
- ◯ Seldom
- ◯ Often
- ◯ Usually
- ◯ Always

Physician/Patient Electronic Messaging: Patient Survey

*** 6. Rate the effectiveness of each of the following reasons for using electronic messages with your physician. If you have never used one of these methods in electronically communicating with your physician, rate how effective you think each might be.**

	Extremely Ineffective	Moderately Ineffective	Mildly Ineffective	Mildly Effective	Moderately Effective	Totally Effective
Dealing with an Emergency	○	○	○	○	○	○
Asking Questions about Medication Usage	○	○	○	○	○	○
Refilling a Prescription	○	○	○	○	○	○
Addressing a New, Non-Emergency 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	○	○	○	○	○	○
Reporting on a Simple Health-Related Problem	○	○	○	○	○	○
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	○	○	○	○	○	○
Helping to Establish the Doctor/Patient Relationship	○	○	○	○	○	○

*** 7. As you know, there are multiple methods for communicating with your physician. For each of the following items, check which method of communication you feel is most effective in each category.**

	Face-to-Face	Telephone Conversation	Telephone Voice Message	Electronic Message
Convenience	○	○	○	○
Efficient Use of Physician Time	○	○	○	○
Efficient Use of Patient Time	○	○	○	○
Confidentiality	○	○	○	○
Value for Your Money	○	○	○	○
Satisfaction	○	○	○	○
Resolution of Health Problem	○	○	○	○
Informative and Educational Nature of Interaction	○	○	○	○
Establishing a Relationship with the Physician	○	○	○	○

Physician/Patient Electronic Messaging: Patient Survey

*** 8. How important is the ability to communicate with your physician using electronic messaging in regard to your health?**

- ◯ Extremely Unimportant
- ◯ Moderately Unimportant
- ◯ Mildly Unimportant
- ◯ Mildly Important
- ◯ Moderately Important
- ◯ Extremely Important

*** 9. How would you rate the overall effectiveness of your use of electronic messaging service between physicians and patients?**

- ◯ Extremely Ineffective
- ◯ Moderately Ineffective
- ◯ Mildly Ineffective
- ◯ Mildly Effective
- ◯ Moderately Effective
- ◯ Extremely Effective

Physician/Patient Electronic Messaging: Patient Survey

2. Demographic Information

10. What is your age?

- ◯ 18-29
- ◯ 30-49
- ◯ 50-64
- ◯ 65 and Over

11. What is your gender?

- ◯ Male
- ◯ Female

12. How many years do you think the main physician you communicate with via electronic messaging has been practicing medicine?

- ◯ Less than 5
- ◯ 5 to 9
- ◯ 10 to 14
- ◯ 15 to 19
- ◯ 20 and Over

Physician/Patient Electronic Messaging: Patient Survey

3. General Questions Concerning Internet Usage and Electronic Messaging

*** 13. What type of Internet access do you predominantly use to electronic message with your physician?**

- ◯ High-Speed Internet
- ◯ Broadband
- ◯ Dial-up
- ◯ I Have No Internet Access
- ◯ I Do Not Know

*** 14. How likely are you to obtain healthcare information by using each of the following resources?**

	Extremely Unlikely	Moderately Unlikely	Mildly Unlikely	Mildly Likely	Moderately Likely	Extremely Likely
Face-to-Face Office Visits with Physician	◯	◯	◯	◯	◯	◯
Electronic Messaging with Physicians	◯	◯	◯	◯	◯	◯
Face-to-Face Conversation with Friends and Family	◯	◯	◯	◯	◯	◯
Electronic Messaging with Friends and Family	◯	◯	◯	◯	◯	◯
Reading Print Media Including Books, Newspapers, and Magazines.	◯	◯	◯	◯	◯	◯
Watching Television	◯	◯	◯	◯	◯	◯
Listening to the Radio	◯	◯	◯	◯	◯	◯
Reading Blogs on the Internet	◯	◯	◯	◯	◯	◯
Using Google, WebMD, or Other Search Engines	◯	◯	◯	◯	◯	◯

*** 15. Overall, is electronic messaging between physicians and patients an effective overall means for conducting healthcare?**

- ◯ Yes
- ◯ No

D.3.2 Physician Survey

Final Version Physician/Patient Electronic Messaging: Physician Survey

1. Physician Survey on Electronic Messaging with Physicians

As a physician who uses UPMC HealthTrak, you are ideally qualified to evaluate the effectiveness of this method of communication with your patients. This brief, online survey is designed to measure how well you feel this service is helping to meet your patients' healthcare needs. Please note that this questionnaire refers to your online electronic messaging with patients, excluding eVisits (which are the ones billed to the patients and/or the insurance company).

There are no foreseeable risks associated with this project, nor are there any direct benefits to you. This is an anonymous questionnaire, and the information you provide will remain strictly confidential. Therefore, please do not include your name or the name of any other person in your responses. Please also note that your participation is voluntary. However, since the form is sent anonymously, it cannot be identified, altered, or retrieved once submitted.

This study is being conducted as part of a UPMC HealthTrak assessment of its physician/patient electronic messaging system and as part of graduate research with the Communication Department of the University of Pittsburgh. Questions concerning any aspect of this study may be forwarded directly to Gary Fischer, MD at (412) 412-692-4888."

Your willingness to participate in this study is greatly appreciated.

*** 1. How often do you communicate with your patients through electronic messaging using HealthTrak?**

- ◯ Never
- ◯ Seldom
- ◯ Occasionally
- ◯ Frequently

*** 2. How often do you initiate electronic messaging with your patients for any reason?**

- ◯ Never
- ◯ Seldom
- ◯ Occasionally
- ◯ Frequently

*** 3. How helpful do you feel the majority of electronic messages between you and your patients are in improving their overall health?**

- ◯ Extremely Unhelpful
- ◯ Moderately Unhelpful
- ◯ Mildly Unhelpful
- ◯ Mildly Helpful
- ◯ Moderately Helpful
- ◯ Extremely Helpful

Final Version Physician/Patient Electronic Messaging: Physician Survey

*** 4. How often do you encourage patients to use electronic messaging with you?**

- ◯ Never
- ◯ Rarely
- ◯ Seldom
- ◯ Often
- ◯ Usually
- ◯ Always

5. On the average, how promptly have you been able to reply to your patient's electronic messages?

- ◯ Respond in More than 48 Hours
- ◯ Respond between 24 and 28 Hours
- ◯ Respond within 24 Hours
- ◯ Respond almost Immediately

*** 6. On average, how often are your patients' health concerns resolved through the electronic message exchanges without you having to direct them to come in to see you for a face-to-face visit?**

- ◯ Never
- ◯ Rarely
- ◯ Seldom
- ◯ Often
- ◯ Usually
- ◯ Always

Final Version Physician/Patient Electronic Messaging: Physician Survey

*** 7. Rate the effectiveness of each of the following reasons for using electronic messages with your patients.**

	Extremely Ineffective	Moderately Ineffective	Mildly Ineffective	Mildly Effective	Moderately Effective	Extremely Effective
Dealing with an Emergency	◯	◯	◯	◯	◯	◯
Responding to Questions about Medication Usage	◯	◯	◯	◯	◯	◯
Refilling a Prescription	◯	◯	◯	◯	◯	◯
Responding to a New, Non-Emergency Health Problem	◯	◯	◯	◯	◯	◯
Responding to a Follow-Up Question Relating to a Recent Visit	◯	◯	◯	◯	◯	◯
Providing Additional Medical Health Information about a Medical Condition	◯	◯	◯	◯	◯	◯
Reviewing Lists of Data Concerning Regularly Monitored Conditions (Blood Pressures, Blood Sugars, Temperatures, etc.)	◯	◯	◯	◯	◯	◯
Responding to a Complex Health-Related Problem	◯	◯	◯	◯	◯	◯
Responding to a Simple Health-Related Problem	◯	◯	◯	◯	◯	◯

8. Rate the effectiveness of each of the following Psychosocial reasons for using electronic messages with your patients.

	Extremely Ineffective	Moderately Ineffective	Mildly Ineffective	Mildly Effective	Moderately Effective	Extremely Effective
Discussing Patients' Feelings, Emotions, and Psychological States Associated with Health-Related Problems	◯	◯	◯	◯	◯	◯
Discussing Relationship Issues as They Involve Your Patients' Healthcare Needs (Marital, Family, or Work-Related, Etc.)	◯	◯	◯	◯	◯	◯
Discussing an Embarrassing Medical or Emotional Health-Related Problem with Patients	◯	◯	◯	◯	◯	◯
Helping to Establish the Doctor/Patient Relationship	◯	◯	◯	◯	◯	◯

Final Version Physician/Patient Electronic Messaging: Physician Survey

*** 9. As you know, there are multiple methods of communicating with your patients. For each of the following items, check which method of communication you feel is most effective in each category.**

	Face-to-Face	Telephone Conversation	Telephone Voice Message	Electronic Message
Convenience	◯	◯	◯	◯
Efficient Use of Physician Time	◯	◯	◯	◯
Efficient Use of Patient Time	◯	◯	◯	◯
Confidentiality	◯	◯	◯	◯
Cost Effectiveness	◯	◯	◯	◯
Patient Satisfaction	◯	◯	◯	◯
Clinical Effectiveness	◯	◯	◯	◯
Informative and Educational Nature of Interaction	◯	◯	◯	◯
Establishing a Relationship with the Patient	◯	◯	◯	◯

*** 10. How important is the ability to communicate with your patients via electronic messaging in regard to their overall health?**

◯ Extremely Unimportant

◯ Moderately Unimportant

◯ Mildly Unimportant

◯ Mildly Important

◯ Moderately Important

◯ Extremely Important

*** 11. How would you rate the overall effectiveness of your use of electronic messaging service between physicians and patients?**

◯ Extremely Ineffective

◯ Moderately Ineffective

◯ Mildly Ineffective

◯ Mildly Effective

◯ Moderately Effective

◯ Extremely Effective

Final Version Physician/Patient Electronic Messaging: Physician Survey

* 12. Over time, as you have continued to use electronic messaging with your patients, how effective do you feel this form of communication has become?

- ◯ Much More Ineffective
- ◯ More Ineffective
- ◯ Somewhat More Ineffective
- ◯ Somewhat More Effective
- ◯ More Effective
- ◯ Much More Effective

Final Version Physician/Patient Electronic Messaging: Physician Survey

2. Demographic Questions

13. What is your age?

- ◯ 18 to 29
- ◯ 30 to 49
- ◯ 50 to 64
- ◯ 65 and Over

14. What is your gender?

- ◯ Male
- ◯ Female

*** 15. On average, how many hours per week do you see outpatients?**

- ◯ 0-8
- ◯ 9-16
- ◯ 17-32
- ◯ 33 and Over

16. How many years has it been since you graduated from medical school?

- ◯ Less than 5
- ◯ 5 to 9
- ◯ 10 to 14
- ◯ 15 to 19
- ◯ 20 and Over

*** 17. How many years have you been using electronic messages to communicate with your patients?**

- ◯ Less than 5
- ◯ 5 to 9
- ◯ 10 to 14
- ◯ 15 to 19
- ◯ Over 20

Final Version Physician/Patient Electronic Messaging: Physician Survey

3. General Questions Concerning Internet Usage and Electronic Messaging

*** 18. How likely do you think it is for your patients to seek healthcare information by using each of the following resources?**

	Extremely Unlikely	Moderately Unlikely	Mildly Unlikely	Mildly Likely	Moderately Likely	Extremely Likely
Conversing with Their Physician	○	○	○	○	○	○
Conversing with Friends and Family	○	○	○	○	○	○
Reading Print Media (Books, Newspapers,Magazines, Etc.)	○	○	○	○	○	○
Tuning in to the Radio or Television	○	○	○	○	○	○
Reading Blogs on the Internet	○	○	○	○	○	○
Using Google, WebMD, or Other Search Engines	○	○	○	○	○	○

*** 19. As a physician, how likely are you to seek medical information from the following sources?**

	Extremely Unlikely	Moderately Unlikely	Mildly Unlikely	Mildly Likely	Moderately Likely	Extremely Likely
Discussing with Other Physicians	○	○	○	○	○	○
Reading Professional Journals and Books	○	○	○	○	○	○
Reading Popular Print Media (Magazines, Newspapers, Etc.)	○	○	○	○	○	○
Tuning in to the Radio or Television	○	○	○	○	○	○
Reading Blogs on the Internet	○	○	○	○	○	○
Using Google, WebMD, or Other Search Engines	○	○	○	○	○	○

*** 20. Is electronic messaging between physicians and patients an effective overall means for conducting healthcare?**

○ Yes

○ No

21. In one sentence, please state the main weaknesses of electronic messaging between physicians and patients.

22. In one sentence, please state the main strengths of electronic messaging between physicians and patients.

D.4 SURVEY RESULTS

D.4.1 Patient Survey Results

Table 14. Q1 patient frequencies about physician response based upon how often send electronic messages to physicians via HealthTrak

valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Rarely	22 0	2 4.2	24.2	24.2
2 Occasionally	593	65.2	65.2	89.3
3 Frequently	97	10.7	10.7	100.0
Total	910	100.0	100.0	

Table 15. Q2 patient frequencies about physician response based upon how easy it is to send electronic messages to physician via HealthTrak

valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly difficult	7	.8	.8	.8
2 Mod Difficult	5	.5	.5	1.3
3. Somewhat Difficult	31	3.4	3.4	4.7
4 Somewhat Easy	93	10.2	10.2	14.9
5 Mod Easy	246	27.0	27.0	42.0
6 Extrmly Easy	528	58.0	58.0	100.0
Total	910	100.0	100.0	

Table 16. Q3 patient frequencies about physician response based upon how helpful email messages from physician in improving your health

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly unhelpful	45	4.9	4.9	4.9
2 Mod Unhelpful	36	4.0	4.0	8.9
3 Mildly Unhelpful	13	1.4	1.4	10.3
4 Mildly Helpful	164	18.0	18.0	28.4
5 Mod Helpful	338	37.1	37.1	65.5
6 Extrmly Helpful	314	34.5	34.5	100.0
Total	910	100.0	100.0	

Table 17. Q4 patient frequencies about physician response based upon how promptly physician responds to message

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Never	17	1.9	1.9	1.9
2 Over a week	5	.5	.5	2.4
3 Within a Week	66	7.3	7.3	9.7
4 Within Two Days	224	24.6	24.6	34.3
5 Within 24 Hours	482	53.0	53.0	87.3
6 Immediately	116	12.7	12.7	100.0
Total	910	100.0	100.0	

Table 18. Q5 patient frequencies about physician response based upon how often concerns resolved through email exchanges without face-to-face

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Never	66	7.3	7.3	7.3
2 Rarely	45	4.9	4.9	12.2
3 Seldom	93	10.2	10.2	22.4
4 Often	240	26.4	26.4	48.8
5 Usually	317	34.8	34.8	83.6
6 Always	149	16.4	16.4	100.0
Total	910	100.0	100.0	

Table 19. Q6.1 patient frequencies on effectiveness of reasons for using electronic messages for dealing with an emergency

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	382	42.0	42.0	42.0
2 Mod Ineffective	119	13.1	13.1	55.1
3 Mild Ineffectlve	57	6.3	6.3	61.3
4 Mild Effective	123	13.5	13.5	74.8
5 Mod Effective	137	15.1	15.1	89.9
6 Totally Effective	92	10.1	10.1	100.0
Total	910	100.0	100.0	

Table 20. Q6.2 patient frequencies on effectiveness of reasons for using electronic messages for asking questions regarding medication usage

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	29	3.2	3.2	3.2
2 Mod Ineffective	18	2.0	2.0	5.2
3 Mild Ineffectlve	12	1.3	1.3	6.5
4 Mild Effective	61	6.7	6.7	13.2
5 Mod Effective	276	30.3	30.3	43.5
6 Totally Effective	514	56.5	56.5	100.0
Total	910	100.0	100.0	

Table 21. Q6.3 patient frequencies on effectiveness of reasons for using electronic messages for refilling prescriptions

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	26	2.9	2.9	2.9
2 Mod Ineffective	10	1.1	1.1	4.0
3 Mild Ineffectlve	9	1.0	1.0	4.9
4 Mild Effective	30	3.3	3.3	8.2
5 Mod Effective	149	16.4	16.4	24.6
6 Totally Effective	686	75.4	75.4	100.0
Total	910	100.0	100.0	

Table 22. Q6.4 patient frequencies on effectiveness of reasons for using electronic messages for addressing new non-emergency health problems

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	23	2.5	2.5	2.5
2 Mod Ineffective	27	3.0	3.0	5.5
3 Mild Ineffectlve	30	3.3	3.3	8.8
4 Mild Effective	151	16.6	16.6	25.4
5 Mod Effective	294	32.3	32.3	57.7
6 Totally Effective	385	42.3	42.3	100.0
Total	910	100.0	100.0	

Table 23. Q6.5 patient frequencies on effectiveness of reasons for using electronic messages for ask follow-up question relating to recent visit

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	22	2.4	2.4	2.4
2 Mod Ineffective	11	1.2	1.2	3.6
3 Mild Ineffectlve	8	.9	.9	4.5
4 Mild Effective	58	6.4	6.4	10.9
5 Mod Effective	242	26.6	26.6	37.5
6 Totally Effective	569	62.5	62.5	100.0
Total	910	100.0	100.0	

Table 24. Q6.6 patient frequencies on effectiveness of reasons for using electronic messages for seeking additional information about a medical health/condition

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	19	2.1	2.1	2.1
2 Mod Ineffective	24	2.6	2.6	4.7
3 Mild Ineffectlve	25	2.7	2.7	7.5
4 Mild Effective	127	14.0	14.0	21.4
5 Mod Effective	303	33.3	33.3	54.7
6 Totally Effective	412	45.3	45.3	100.0
Total	910	100.0	100.0	

Table 25. Q6.7 patient frequencies on effectiveness of reasons for using electronic messages for reporting on regularly monitored conditions

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	19	2.1	2.1	2.1
2 Mod Ineffective	10	1.1	1.1	3.2
3 Mild Ineffectlve	20	2.2	2.2	5.4
4 Mild Effective	76	8.4	8.4	13.7
5 Mod Effective	228	25.1	25.1	38.8
6 Totally Effective	557	61.2	61.2	100.0
Total	910	100.0	100.0	

Table 26. Q6.8 patient frequencies on effectiveness of reasons for using electronic messages for reporting on complex health-related problem

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	19	2.1	2.1	2.1
2 Mod Ineffective	10	1.1	1.1	3.2
3 Mild Ineffectlve	20	2.2	2.2	5.4
4 Mild Effective	76	8.4	8.4	13.7
5 Mod Effective	228	25.1	25.1	38.8
6 Totally Effective	557	61.2	61.2	100.0
Total	910	100.0	100.0	

Table 27. Q6.9 patient frequencies on effectiveness of reasons for using electronic messages for reporting on simple health-related problem

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	22	2.4	2.4	2.4
2 Mod Ineffective	16	1.8	1.8	4.2
3 Mild Ineffectlve	20	2.2	2.2	6.4
4 Mild Effective	106	11.6	11.6	18.0
5 Mod Effective	299	32.9	32.9	50.9
6 Totally Effective	447	49.1	49.1	100.0
Total	910	100.0	100.0	

Table 28. Q6 patient frequencies on effectiveness of reasons for using electronic messages for patient descriptive statistics of effectiveness of reasons for using electronic messages

	N	Minimum	Maximum	Mean	Std. Deviation
Q6.1 Dealing with an emergency	910	1	6	2.77	1.846
Q6.2 Asking questions re medication usage	910	1	6	5.28	1.137
Q6.3 Refilling prescription	910	1	6	5.55	1.038
Q6.4 Addressing new non-emergency health problem	910	1	6	5.00	1.181
Q6.5 Ask follow-up question relating to recent visit	910	1	6	5.41	1.026
Q6.6 Seeking additional information about a medical condition	910	1	6	5.10	1.125
Q6.7 Reporting on regularly monitored conditions	910	1	6	5.37	1.040
Q6.8 Reporting on complex health-related problem	910	1	6	4.03	1.603
Q6.9 Reporting on simple health-related problem	910	1	6	5.18	1.100
Valid N (listwise)	910				

Table 29. Q6 patient descriptive statistics of effectiveness of reasons for using electronic messages high to low mean

	N	Minimum	Maximum	Mean	Std. Deviation
Q6.3 Refilling prescription	910	1	6	5.55	1.038
Q6.5 Ask follow-up question relating to recent visit	910	1	6	5.41	1.026
Q6.7 Reporting on regularly monitored conditions	910	1	6	5.37	1.040
Q6.2 Asking questions re medication usage	910	1	6	5.28	1.137
Q6.9 Reporting on simple health-related problem	910	1	6	5.18	1.100
Q6.6 Seeking additional information about a medical condition	910	1	6	5.10	1.125
Q6.4 Addressing new non-emergency health problem	910	1	6	5.00	1.181
Q6.8 Reporting on complex health-related problem	910	1	6	4.03	1.603
Q6.1 Dealing with an emergency	910	1	6	2.77	1.846
Valid N (listwise)	910				

Table 30. Q6.10 patient frequencies on effectiveness of reasons for using electronic messages when discussing feelings associated with health-related problems

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	168	18.5	18.5	18.5
2 Mod Ineffective	133	14.6	14.6	33.1
3 Mild Ineffectlve	102	11.2	11.2	44.3
4 Mild Effective	205	22.5	22.5	66.8
5 Mod Effective	169	18.6	18.6	85.4
6 Totally Effective	133	14.6	14.6	100.0
Total	910	100.0	100.0	

Table 31. Q6.11 patient frequencies on effectiveness of reasons for using electronic messages when discussing relationship issues associated with healthcare needs

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	197	21.6	21.6	21.6
2 Mod Ineffective	137	15.1	15.1	36.7
3 Mild Ineffectlve	113	12.4	12.4	49.1
4 Mild Effective	192	21.1	21.1	70.2
5 Mod Effective	150	16.5	16.5	86.7
6 Totally Effective	121	13.3	13.3	100.0
Total	910	100.0	100.0	

Table 32. Q6.12 patient frequencies on effectiveness of reasons for using electronic messages when discussing embarrassing medical or emotional health problems

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	163	17.9	17.9	17.9
2 Mod Ineffective	94	10.3	10.3	28.2
3 Mild Ineffectlve	94	10.3	10.3	38.6
4 Mild Effective	187	20.5	20.5	59.1
5 Mod Effective	213	23.4	23.4	82.5
6 Totally Effective	159	17.5	17.5	100.0
Total	910	100.0	100.0	

Table 33. Q6.13 patient frequencies on effectiveness of reasons for using electronic messages when helping establish doctor-patient relationship

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	83	9.1	9.1	9.1
2 Mod Ineffective	51	5.6	5.6	14.7
3 Mild Ineffectlve	72	7.9	7.9	22.6
4 Mild Effective	186	20.4	20.4	43.1
5 Mod Effective	230	25.3	25.3	68.4
6 Totally Effective	288	31.6	31.6	100.0
Total	910	100.0	100.0	

Table 34. Q6j-m patient descriptive statistics on effectiveness of reasons for using electronic messages concerning emotional/relationship issues

	N	Minimum	Maximum	Mean	Std. Deviation
Q6.10 Discussing feelings assoc w health-related problems	910	1	6	3.52	1.703
Q6.11 Discussing relationship issues assoc w health care needs	910	1	6	3.36	1.720
Q6.12 Discussing embarrassing medical or emotional health problem	910	1	6	3.74	1.731
Q6.13 Helping establish doctor-patient relationship	910	1	6	4.42	1.571
Valid N (listwise)	910				

Table 35. Q7.1 patient frequencies on method (medium) of communication used most effective for convenience

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	60	6.6	6.6	6.6
	2 Phone Conversation	100	11.0	11.0	17.7
	3 Phone Voice Message	8	.9	.9	18.5
	4 Electronic Message	738	81.1	81.5	100.0
	Total	906	99.6	100.0	
Missing	System	4	.4		
Total		910	100.0		

Table 36. Q7.2 patient frequencies on method (medium) of communication used most effective for efficient use of physician time

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	96	10.5	10.7	10.7
	2 Phone Conversation	69	7.6	7.7	18.4
	3 Phone Voice Message	18	2.0	2.0	20.4
	4 Electronic Message	714	78.5	79.6	100.0
	Total	897	98.6	100.0	
Missing	System	13	1.4		
Total		910	100.0		

Table 37. Q7.3 patient frequencies on method (medium) of communication used most effective for efficient use of patient time

		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	113	12.4	12.6	12.6
	2 Phone Conversation	119	13.1	13.3	25.9
	3 Phone Voice Message	9	1.0	1.0	26.9
	4 Electronic Message	655	72.0	73.1	100.0
	Total	896	98.5	100.0	
Missing	System	14	1.5		
Total		910	100.0		

Table 38. Q7.4 patient frequencies on method (medium) of communication used most effective for confidentiality

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	558	61.3	62.7	62.7
	2 Phone Conversation	87	9.6	9.8	72.5
	3 Phone Voice Message	3	.3	.3	72.8
	4 Electronic Message	242	26.6	27.2	100.0
	Total	890	97.8	100.0	
Missing	System	20	2.2		
Total		910	100.0		

Table 39. Q7.5 patient frequencies on method (medium) of communication used most value for your money

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	341	37.5	38.5	38.5
	2 Phone Conversation	78	8.6	8.8	47.3
	3 Phone Voice Message	4	.4	.5	47.8
	4 Electronic Message	462	50.8	52.2	100.0
	Total	885	97.3	100.0	
Missing	System	25	2.7		
Total		910	100.0		

Table 40. Q7.6 patient frequencies on method (medium) of communication used most effective for satisfaction

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	500	54.9	56.4	56.4
	2 Phone Conversation	88	9.7	9.9	66.3
	3 Phone Voice Message	6	.7	.7	67.0
	4 Electronic Message	293	32.2	33.0	100.0
	Total	887	97.5	100.0	
Missing	System	23	2.5		
	Total	910	100.0		

Table 41. Q7.7 patient frequencies on method (medium) of communication used most effective to resolve health problem

		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	621	68.2	69.5	69.5
	2 Phone Conversation	77	8.5	8.6	78.2
	3 Phone Voice Message	13	1.4	1.5	79.6
	4 Electronic Message	182	20.0	20.4	100.0
	Total	893	98.1	100.0	
Missing	System	17	1.9		
Total		910	100.0		

Table 42. Q7.8 patient frequencies on method (medium) of communication used most effective for information/education

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	392	43.1	44.1	44.1
	2 Phone Conversation	84	9.2	9.4	53.5
	3 Phone Voice Message	9	1.0	1.0	54.6
	4 Electronic Message	404	44.4	45.4	100.0
	Total	889	97.7	100.0	
Missing	System	21	2.3		
Total		910	100.0		

Table 43. Q7.9 patient frequencies on method (medium) of communication used most effective to establish relationship with physician

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	780	85.7	86.8	86.8
	2 Phone Conversation	21	2.3	2.3	89.1
	3 Phone Voice Message	3	.3	.3	89.4
	4 Electronic Message	95	10.4	10.6	100.0
	Total	899	98.8	100.0	
Missing	System	11	1.2		
Total		910	100.0		

Table 44. Q8 patient frequencies on how important to communicate w physician using electronic messaging in regard to health

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Unimportant	35	3.8	3.8	3.8
2 Mod Unimportant	35	3.8	3.8	7.7
3 Mild Unimportant	15	1.6	1.6	9.3
4 Mild Important	121	13.3	13.3	22.6
5 Mod Important	342	37.6	37.6	60.2
6 Extrmly Important	362	39.8	39.8	100.0
Total	910	100.0	100.0	

Table 45. Q9 patient frequencies on overall effectiveness of electronic messaging system between physicians and patients

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	22	2.4	2.4	2.4
2 Mod Ineffective	32	3.5	3.5	5.9
3 Mild Ineffectlve	12	1.3	1.3	7.3
4 Mild Effective	83	9.1	9.1	16.4
5 Mod Effective	347	38.1	38.1	54.5
6 Totally Effective	414	45.5	45.5	100.0
Total	910	100.0	100.0	

Table 46. Patient descriptive statistics on importance (Q8) and effectiveness (Q9) of electronic messaging with physician

	N	Minimum	Maximum	Mean	Std. Deviation
Q8 How important to communicate w physician using electronic messaging in regard to health	910	1	6	4.96	1.248
Q9 Overall effectiveness of electronic messaging system btwn physicians and patients	910	1	6	5.14	1.134
Valid N (listwise)	910				

Table 47. Q10 patient demographic frequencies on age

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 18-29	65	7.1	7.2	7.2
	2 30-49	244	26.8	27.0	34.1
	3 50-64	393	43.2	43.4	77.6
	4 65 and Over	203	22.3	22.4	100.0
	Total	905	99.5	100.0	
Missing	System	5	.5		
Total		910	100.0		

Table 48. Q11 patient demographic frequencies on gender

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Male	260	28.6	28.8	28.8
	2 Female	643	70.7	71.2	100.0
	Total	903	99.2	100.0	
Missing	System	7	.8		
	Total	910	100.0		

Table 49. Q12 patient demographic frequencies on how many years physician has practiced medicine

		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Less than 5	53	5.8	5.9	5.9
	2 5 to 9	149	16.4	16.5	22.3
	3 10 to 14	223	24.5	24.7	47.0
	4 15 to 19	196	21.5	21.7	68.7
	5 20 and Over	283	31.1	31.3	100.0
	Total	904	99.3	100.0	
Missing	System	6	.7		
	Total	910	100.0		

Table 50. Q13 patient demographic frequencies on type of Internet access

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 High-Speed Internet	769	84.5	85.3	85.3
	2 Broadband	97	10.7	10.8	96.0
	3 Dial-up	6	.7	.7	96.7
	4 No Internet Access	1	.1	.1	96.8
	5 Don't Know	29	3.2	3.2	100.0
	Total	902	99.1	100.0	
Missing	System	8	.9		
	Total	910	100.0		

Table 51. Q14.1 patient frequencies on how patients likely obtain healthcare information through face-to-face visits with physician

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Unlikely	7	.8	.8	.8
	2 Mod Unlikely	10	1.1	1.1	1.9
	3 Mild Unlikely	12	1.3	1.3	3.2
	4 Mild Likely	40	4.4	4.4	7.7
	5 Mod Likely	158	17.4	17.5	25.2
	6 Extrmly Likely	674	74.1	74.8	100.0
	Total	901	99.0	100.0	
Missing	System	9	1.0		
	Total	910	100.0		

Table 52. Q14.2 patient frequencies on how patients likely obtain healthcare information through electronic messaging with physician

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Unlikely	8	.9	.9	.9
	2 Mod Likely	9	1.0	1.0	1.9
	3 Mild Likely	17	1.9	1.9	3.8
	4 Mild Likely	98	10.8	11.0	14.8
	5 Mod Likely	269	29.6	30.1	44.9
	6 Extrmly Likely	493	54.2	55.1	100.0
	Total	894	98.2	100.0	
Missing	System	16	1.8		
	Total	910	100.0		

Table 53. Q14.3 patient frequencies on how patients likely obtain healthcare information through face-to-face conversation with friends and family

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Unlikely	85	9.3	9.6	9.6
	2 Mod Likely	92	10.1	10.3	19.9
	3 Mild Likely	130	14.3	14.6	34.5
	4 Mild Likely	222	24.4	24.9	59.4
	5 Mod Likely	186	20.4	20.9	80.3
	6 Extrmly Likely	175	19.2	19.7	100.0
	Total	890	97.8	100.0	
Missing	System	20	2.2		
	Total	910	100.0		

Table 54. Q14.4 patient frequencies on how patients likely obtain healthcare information through electronic messaging with friends and family

		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Unlikely	175	19.2	19.7	19.7
	2 Mod Unlikely	140	15.4	15.7	35.4
	3 Mild Unlikely	145	15.9	16.3	51.7
	4 Mild Likely	163	17.9	18.3	70.0
	5 Mod Likely	134	14.7	15.1	85.1
	6 Extrmly Likely	133	14.6	14.9	100.0
	Total	890	97.8	100.0	
Missing	System	20	2.2		
	Total	910	100.0		

Table 55. Q14.5 patient frequencies on how patients likely obtain healthcare information through reading print media

		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Unlikely	48	5.3	5.4	5.4
	2 Mod Likely	43	4.7	4.8	10.2
	3 Mild Likely	82	9.0	9.2	19.3
	4 Mild Likely	251	27.6	28.0	47.3
	5 Mod Likely	250	27.5	27.9	75.2
	6 Extrmly Likely	222	24.4	24.8	100.0
	Total	896	98.5	100.0	
Missing	System	14	1.5		
	Total	910	100.0		

Table 56. Q14.6 patient frequencies on how patients obtain healthcare information through watching television

	Valid	Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Unlikely	204	22.4	22.8	22.8
	2 Mod Likely	143	15.7	16.0	38.8
	3 Mild Likely	146	16.0	16.3	55.1
	4 Mild Likely	226	24.8	25.3	80.3
	5 Mod Likely	105	11.5	11.7	92.1
	6 Extrmly Likely	71	7.8	7.9	100.0
	Total	895	98.4	100.0	
Missing	System	15	1.6		
	Total	910	100.0		

Table 57. Q14.7 patient frequencies on how patients obtain healthcare information through listening to the radio

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Unlikely	270	29.7	30.2	30.2
	2 Mod Likely	156	17.1	17.5	47.7
	3 Mild Likely	165	18.1	18.5	66.2
	4 Mild Likely	172	18.9	19.3	85.4
	5 Mod Likely	76	8.4	8.5	94.0
	6 Extrmly Likely	54	5.9	6.0	100.0
	Total	893	98.1	100.0	
Missing	System	17	1.9		
	Total	910	100.0		

Table 58. Q14.8 patient frequencies on how patients obtain health information through reading blogs on the Internet

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Unlikely	345	37.9	38.8	38.8
	2 Mod Likely	147	16.2	16.5	55.3
	3 Mild Likely	127	14.0	14.3	69.6
	4 Mild Likely	147	16.2	16.5	86.2
	5 Mod Likely	79	8.7	8.9	95.1
	6 Extrmly Likely	44	4.8	4.9	100.0
	Total	889	97.7	100.0	
Missing	System	21	2.3		
	Total	910	100.0		

Table 59. Q14.9 patient frequencies on how patients obtain health information through using Google, WebMD, or other search engines

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Unlikely	31	3.4	3.5	3.5
	2 Mod Likely	32	3.5	3.6	7.1
	3 Mild Likely	40	4.4	4.5	11.5
	4 Mild Likely	186	20.4	20.8	32.4
	5 Mod Likely	296	32.5	33.1	65.5
	6 Extrmly Likely	308	33.8	34.5	100.0
	Total	893	98.1	100.0	
Missing	System	17	1.9		
	Total	910	100.0		

Table 60. Q14 patient descriptive statistics on how patients likely obtain healthcare information

	N	Minimum	Maximum	Mean	Std. Deviation
Q14.1 Obtain info face-to-face office visits w physician	901	1	6	5.61	.834
Q14.2 Obtain info electronic messaging w physician	894	1	6	5.34	.926
Q14.3 Obtain info face-to-face conversation w friends & family	890	1	6	3.96	1.554
Q14.4 Obtain info electronic messaging w friends & family	890	1	6	3.38	1.712
Q14.5 Obtain info reading print media	896	1	6	4.43	1.362
Q14.6 Obtain info watching television	895	1	6	3.11	1.581
14.7 Obtain info listening to radio	893	1	6	2.76	1.552
Q14.8 Obtain info reading blogs on Internet	889	1	6	2.55	1.576
Q14.9 Obtain info using Google, WebMD, or other search engine	893	1	6	4.80	1.254
Valid N (listwise)	856				

Table 61. Q14 patient descriptive statistics on how patients likely obtain healthcare information with high to low mean

	N	Minimum	Maximum	Mean	Std. Deviation
Q14.1 Obtain info face-to-face office visits w physician	901	1	6	5.61	.834
Q14.2 Obtain info electronic messaging w physician	894	1	6	5.34	.926
Q14.9 Obtain info using Google, WebMD, or other search engine	893	1	6	4.80	1.254
Q14.5 Obtain info reading print media	896	1	6	4.43	1.362
Q14.3 Obtain info face-to-face conversation w friends & family	890	1	6	3.96	1.554
Q14.4 Obtain info electronic messaging w friends & family	890	1	6	3.38	1.712
Q14.6 Obtain info watching television	895	1	6	3.11	1.581
Q14.7 Obtain info listening to radio	893	1	6	2.76	1.552
Q14.8 Obtain info reading blogs on Internet	889	1	6	2.55	1.576
Valid N (listwise)	856				

Table 62. Q15 patient frequencies for overall efficacy of electronic messaging for conducting healthcare

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Yes	821	90.2	91.0	91.0
	2 No	81	8.9	9.0	100.0
	Total	902	99.1	100.0	
Missing	System	8	.9		
	Total	910	100.0		

Table 63. Patient correlations with original DV all items

		q9 Overall effectiveness of electronic messaging system btwn physicians and patients
q1 How often send electronic messages to physician via HealthTrak	Pearson Correlation	.185**
	Sig. (2-tailed)	.000
	N	910
q2 How easy to send electronic messages to physician via HealthTrak	Pearson Correlation	.415**
	Sig. (2-tailed)	.000
	N	910
q3 How helpful email messages from physician in improving your health	Pearson Correlation	.221**
	Sig. (2-tailed)	.000
	N	910
q4 How promptly physician responds to message	Pearson Correlation	.388**
	Sig. (2-tailed)	.000
	N	910
q5 How often concerns resolved through email exchanges w/o face-to-face visit	Pearson Correlation	.367**
	Sig. (2-tailed)	.000
	N	910
q61to9mean	Pearson Correlation	.452**
	Sig. (2-tailed)	.000
	N	910
q610to13mean	Pearson Correlation	.316**
	Sig. (2-tailed)	.000
	N	910
q7_count4s Times email chosen as most effective	Pearson Correlation	.308**
	Sig. (2-tailed)	.000
	N	910
q8 How important to communicate w physician using electronic messaging in regard to	Pearson Correlation	.529**
	Sig. (2-tailed)	.000
	N	910

health		
q10 Age	Pearson Correlation	-.024
	Sig. (2-tailed)	.467
	N	905
q11 Gender	Pearson Correlation	.053
	Sig. (2-tailed)	.109
	N	903
q12 How many years physician has practiced medicine	Pearson Correlation	.049
	Sig. (2-tailed)	.144
	N	904
q14.4 Obtain info electronic messaging w friends & family	Pearson Correlation	.060
	Sig. (2-tailed)	.076
	N	890
**. Correlation is significant at the 0.01 level (2-tailed).		

Table 64. Patient correlations with transformed DV all items

		recip_DV_ reflect
q1 How often send electronic messages to physician via HealthTrak	Pearson Correlation	.231**
	Sig. (2-tailed)	.000
	N	910
q2 How easy to send electronic messages to physician via HealthTrak	Pearson Correlation	.415**
	Sig. (2-tailed)	.000
	N	910
q3 How helpful email messages from physician in improving your health	Pearson Correlation	.230**
	Sig. (2-tailed)	.000
	N	910
q4 How promptly physician responds to message	Pearson Correlation	.378**
	Sig. (2-tailed)	.000
	N	910
q5 How often concerns resolved through email exchanges w/o face-to-face visit	Pearson Correlation	.400**
	Sig. (2-tailed)	.000
	N	910
q61to9mean	Pearson Correlation	.462**
	Sig. (2-tailed)	.000
	N	910
q610to13mean	Pearson Correlation	.381**

	Sig. (2-tailed)	.000
	N	910
q7_count4s Times email chosen as most effective	Pearson Correlation	.392**
	Sig. (2-tailed)	.000
	N	910
q8 How important to communicate w physician using electronic messaging in regard to health	Pearson Correlation	.476**
	Sig. (2-tailed)	.000
	N	910
q10 Age	Pearson Correlation	.009
	Sig. (2-tailed)	.791
	N	905
q11 Gender	Pearson Correlation	.071*
	Sig. (2-tailed)	.033
	N	903
q12 How many years physician has practiced medicine	Pearson Correlation	.035
	Sig. (2-tailed)	.299
	N	904
q14.4 Obtain info electronic messaging w friends & family	Pearson Correlation	.054
	Sig. (2-tailed)	.109
	N	890
**. Correlation is significant at the 0.01 level (2-tailed).		
*. Correlation is significant at the 0.05 level (2-tailed).		

Table 65. Patient correlations among predictors

		q1 How often send electronic messages to physician via HealthTrak	q2 How easy to send electronic messages to physician via HealthTrak	q3 How helpful email messages from physician in improving your health	q4 How promptly physician responds to message	q5 How often concerns resolved through email exchanges w/o face-to-face visit	q61to9 mean
q1 How often send electronic messages to	Pearson Correla-tion	1					

physician via HealthTrak	Sig. (2-tailed)						
	N	910					
q2 How easy to send electronic messages to physician via HealthTrak	Pearson Correlation	.203**	1				
	Sig. (2-tailed)	.000					
	N	910					
q3 How helpful email messages from physician in improving your health	Pearson Correlation	.138**	.305**	1			
	Sig. (2-tailed)	.000	.000				
	N	910	910	910			
q4 How promptly physician responds to message	Pearson Correlation	.177**	.312**	.231**	1		
	Sig. (2-tailed)	00	.0 00	.0 00			
	N	910	910	910	910		
q5 How often concerns resolved through email exchanges w/o face-to-face visit	Pearson Correlation	.157**	.327**	.265**	.322**	1	
	Sig. (2-tailed)	.000	.000	.000	.000		
	N	910	910	910	910		
q61to9mean	Pearson Correlation	.226**	.425**	.291**	.350**	.337**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	910	910	910	910	910	

		Q1	Q2	Q3	Q4	Q5	Q6 1-9
q610to13mean	Pearson Correlation	.215**	.267**	.152**	.203**	.259**	.609**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	910	910	910	910	910	910
q7_count4s Times email chosen as most effective	Pearson Correlation	.233**	.284**	.130**	.228**	.264**	.338**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	910	910	910	910	910	910
q8 How important to communicate w physician using electronic messaging in regard to health	Pearson Correlation	.178**	.208**	.173**	.154**	.199**	.280**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	910	910	910	910	910	910
q10 Age	Pearson Correlation	.007	.017	.002	.103**	.030	-.029
	Sig. (2-tailed)	.844	.614	.948	.002	.364	.382
	N	905	905	905	905	905	905
q11 Gender	Pearson Correlation	-.018	.104**	.064	-.053	.036	.073*
	Sig. (2-tailed)	.599	.002	.055	.111	.284	.027
	N	903	903	903	903	903	903
q12 How many years physician has practiced medicine	Pearson Correlation	-.022	.044	.069*	.089**	.116**	.084*
	Sig. (2-tailed)	.516	.184	.037	.007	.000	.012
	N	904	904	904	904	904	904
q14.4 Obtain	Pearson	.115**	.017	.040	.055	.023	.120**

info electronic messaging w friends & family	Correla-tion						
	Sig. (2-tailed)	.001	.613	.239	.100	.493	.000
	N	890	890	890	890	890	890

		Q6 10 to 13	Q7	Q8	Q10	Q11	Q12	Q14
q610to13mean	Pearson Correla-tion	1						
	Sig. (2-tailed)							
	N	910						
q7_count4s Times email chosen as most effective	Pearson Correla-tion	.357**						
	Sig. (2-tailed)	.000						
	N	910	910					
q8 How important to communicate w physician using electronic messaging in regard to health	Pearson Correla-tion	.248**	].239**	1				
	Sig. (2-tailed)	.000	.000					
	N	910	910	910				
q10 Age	Pearson Correla-tion	-.136**	-.049	-.062	1			
	Sig. (2-tailed)	.000	.141	.060				
	N	905	905	905	905			
q11 Gender	Pearson Correla-tion	.076*	.048	.050	-.159**	1		
	Sig. (2-tailed)	.022	.148	.132	.000			
	N	903	903	903	900	903		

q12 How many years physician has practiced medicine	Pearson Correlation	-.037	-.002	-.023	.322**	-.152**	1	
	Sig. (2-tailed)	.265	.944	.490	.000	.000		
	N	904	904	904	900	899		
q14.4 Obtain info electronic messaging w friends & family	Pearson Correlation	.241**	.167**	.121**	-.119**	.097**	-.081*	1
	Sig. (2-tailed)	.000	.000	.000	.000	.004	.016	
	N	890	890	890	886	884	886	

Table 66. Patient regression model summary

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.688[a]	.474	.466	.828	2.061
a. Predictors: (Constant), q12 How many years physician has practiced medicine, q7_count4s Times email chosen as most effective, q3 How helpful email messages from physician in improving your health, q11 Gender, q1 How often send electronic messages to physician via HealthTrak, q8 How important to communicate w physician using electronic messaging in regard to health, q4 How promptly physician responds to message, q10 Age, q5 How often concerns resolved through email exchanges w/o face-to-face visit, q610to13mean, q2 How easy to send electronic messages to physician via HealthTrak, q14.2 Obtain info electronic messaging w physician, q61to9mean					
b. Dependent Variable: q9 Overall effectiveness of electronic messaging system btwn physicians and patients					

Table 67. Patient regression using ANOVA

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	535.851	13	41.219	60.160	.000[a]
	Residual	594.716	868	.685		
	Total	1130.567	881			

a. Predictors: (Constant), q12 How many years physician has practiced medicine, q7_count4s Times email chosen as most effective, q3 How helpful email messages from physician in improving your health, q11 Gender, q1 How often send electronic messages to physician via HealthTrak, q8 How important to communicate w physician using electronic messaging in regard to health, q4 How promptly physician responds to message, q10 Age, q5 How often concerns resolved through email exchanges w/o face-to-face visit, q610to13mean, q2 How easy to send electronic messages to physician via HealthTrak, q14.2 Obtain info electronic messaging w physician, q61to9mean

b. Dependent Variable: q9 Overall effectiveness of electronic messaging system btwn physicians and patients

Table 68. Patient table determining largest standardized regression coefficient

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.349	.276		-1.268	.205
	q1 How often send electronic messages to physician via HealthTrak	-.054	.052	-.027	-1.032	.302
	q2 How easy to send electronic messages to physician via HealthTrak	.191	.036	.156	5.363	.000
	q3 How helpful email messages from physician in improving your health	-.022	.024	-.025	-.933	.351
	q4 How promptly physician responds to message	.209	.034	.173	6.213	.000
	q5 How often concerns resolved through email exchanges w/o face-to-	.080	.023	.098	3.445	.001

	face visit					
	q61to9mean	.177	.045	.140	3.970	.000
	q610to13mean	-.006	.025	-.007	-.230	.818
	q7_count4s Times email chosen as most effective	.011	.013	.023	.824	.410
	q8 How important to communicate w physician using electronic messaging in regard to health	.339	.024	.374	13.942	.000
	q10 Age	-.024	.035	-.019	-.697	.486
	q11 Gender	.025	.064	.010	.387	.699
	q14.2 Obtain info electronic messaging w physician	.144	.037	.118	3.857	.000
	q12 How many years physician has practiced medicine	.015	.024	.017	.641	.522

a. Dependent Variable: q9 Overall effectiveness of electronic messaging system btwn physicians and patients

Table 69. Patient table using collinearity statistics

Coefficients[a]			
Model		Collinearity Statistics	
		Tolerance	VIF
	(Constant)		
	q1 How often send electronic messages to physician via HealthTrak	.868	1.152
	q2 How easy to send electronic messages to physician via HealthTrak	.716	1.396
	q3 How helpful email messages from physician in improving your health	.840	1.190
	q4 How promptly	.780	1.282

	physician responds to message		
	q5 How often concerns resolved through email exchanges w/o face-to-face visit	.754	1.327
	q61to9mean	.488	2.048
	q610to13mean	.571	1.750
	q7_count4s Times email chosen as most effective	.746	1.340
	q8 How important to communicate w physician using electronic messaging in regard to health	.841	1.189
	q10 Age	.855	1.170
	q11 Gender	.937	1.067
	q14.2 Obtain info electronic messaging w physician	.648	1.544
	q12 How many years physician has practiced medicine	.858	1.166

a. Dependent Variable: q9 Overall effectiveness of electronic messaging system between physicians and patients

Table 70. Patient table listing outliers (casewise diagnostics)

Casewise Diagnostics[a]					
Case Number		Std. Residual	q9 Overall effectiveness of electronic messaging system btwn physicians and patients	Predicted Value	Residual
_	11	-3.597	1	3.98	-2.977
	95	-3.766	1	4.12	-3.117
	108	-3.113	2	4.58	-2.577
	123	-3.744	1	4.10	-3.099
	141	-3.228	2	4.67	-2.672
	150	-4.297	1	4.56	-3.557
	203	-4.697	1	4.89	-3.888
	211	-3.542	2	4.93	-2.932
	256	-3.667	1	4.03	-3.035
	326	-3.987	1	4.30	-3.300
	357	-4.027	2	5.33	-3.333
	481	-3.242	2	4.68	-2.684
	555	-3.789	1	4.14	-3.136
	588	-4.994	1	5.13	-4.134
	605	-4.370	2	5.62	-3.617
	612	-3.550	1	3.94	-2.938
	644	-3.090	2	4.56	-2.557
	667	-3.721	1	4.08	-3.080
	693	-3.071	2	4.54	-2.542
	705	-3.995	2	5.31	-3.307
	801	-3.134	2	4.59	-2.594
	854	-4.386	1	4.63	-3.631
	864	-3.664	1	4.03	-3.033
a. Dependent Variable: q9 Overall effectiveness of electronic messaging system btwn physicians and patients					

Table 71. Patient table showing residuals statistics

Residuals Statistics					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.72	6.42	5.14	.780	882
Residual	-4.134	2.151	.000	.822	882
Std. Predicted Value	-5.668	1.638	.000	1.000	882
Std. Residual	-4.994	2.598	.000	.993	882
a. Dependent Variable: q9 Overall effectiveness of electronic messaging system btwn physicians and patients					

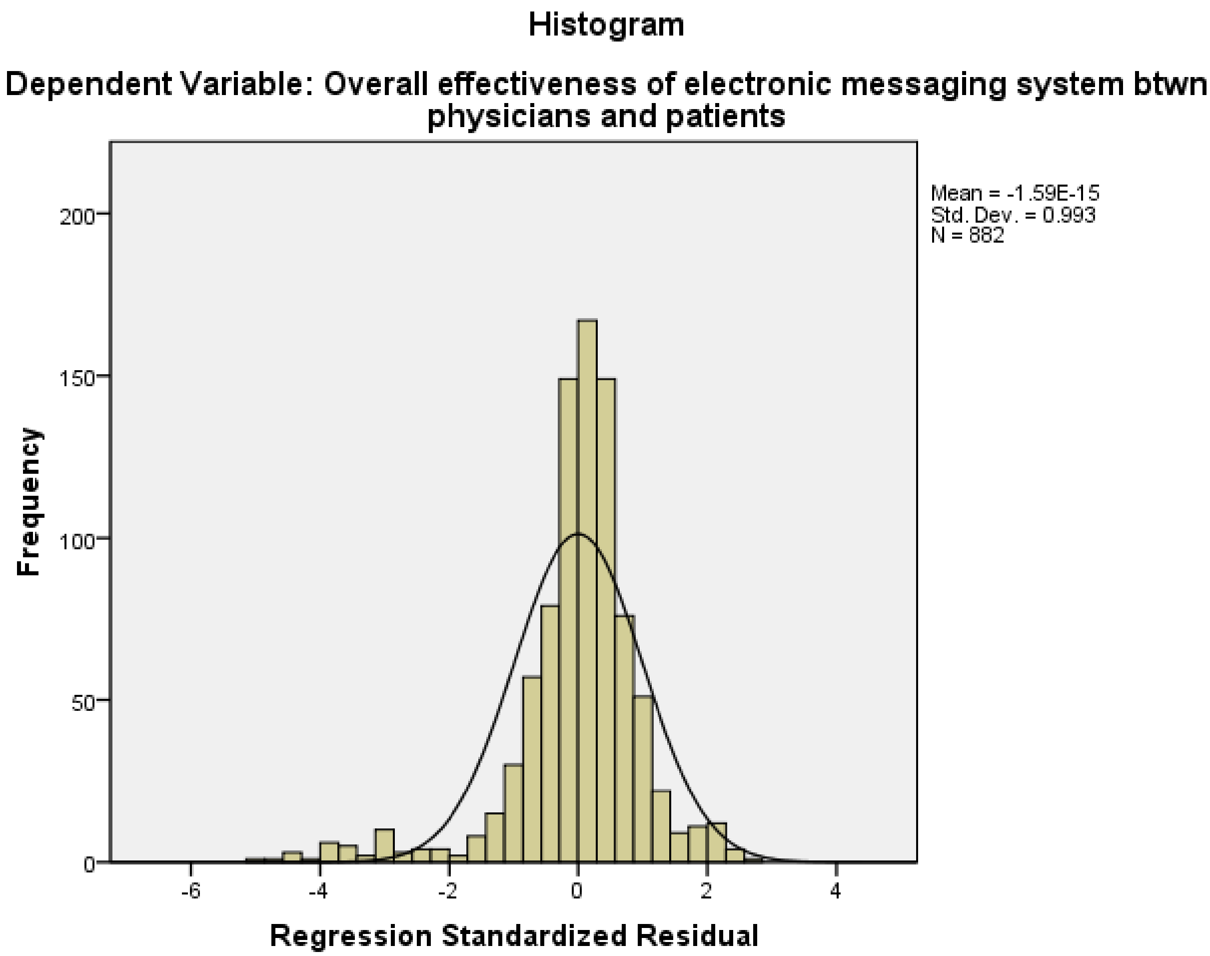


Figure 6. Histogram on patient distribution of residuals (that does not appear to be normal) on overall effectiveness

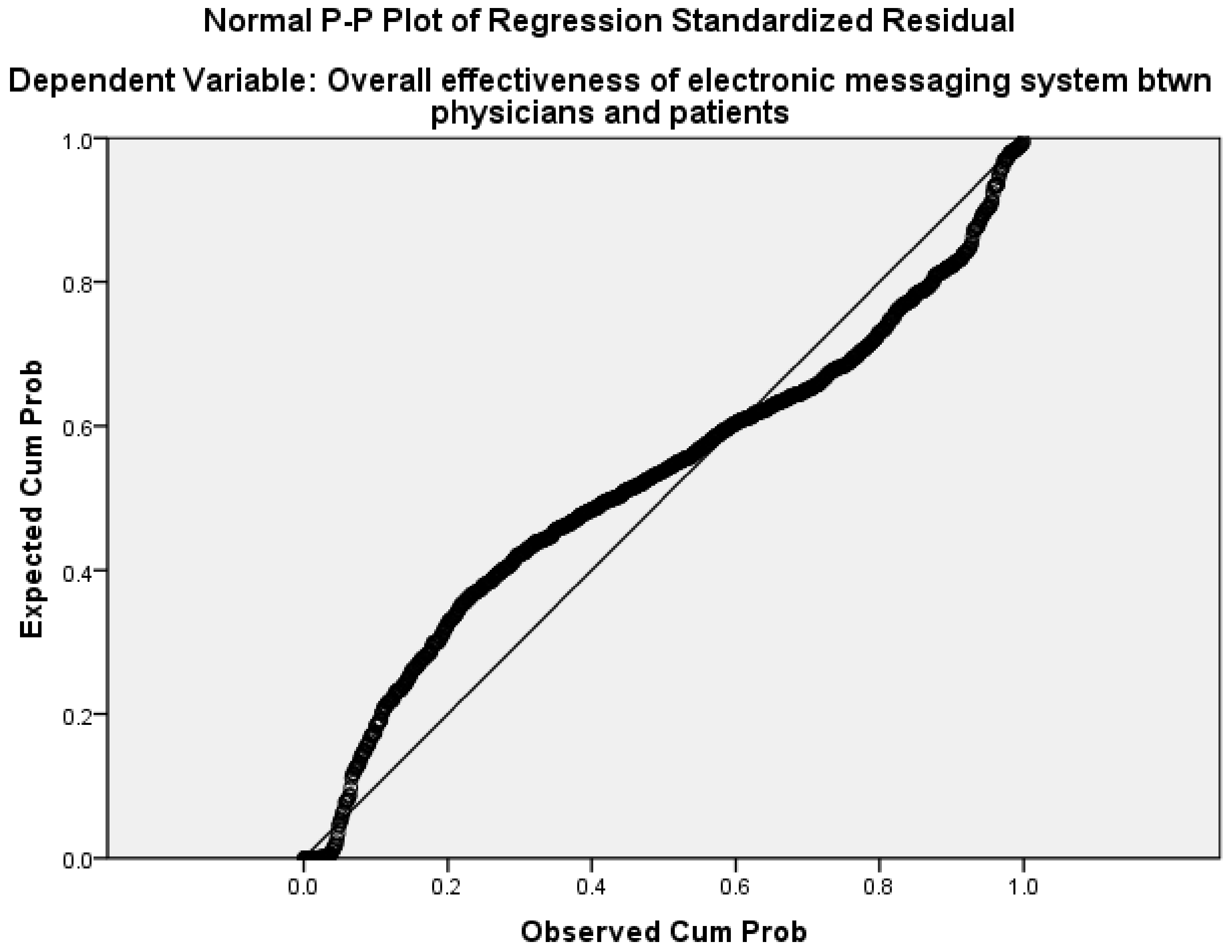


Figure 7. Normal P-P Plot of regression standardized residual on overall effectiveness

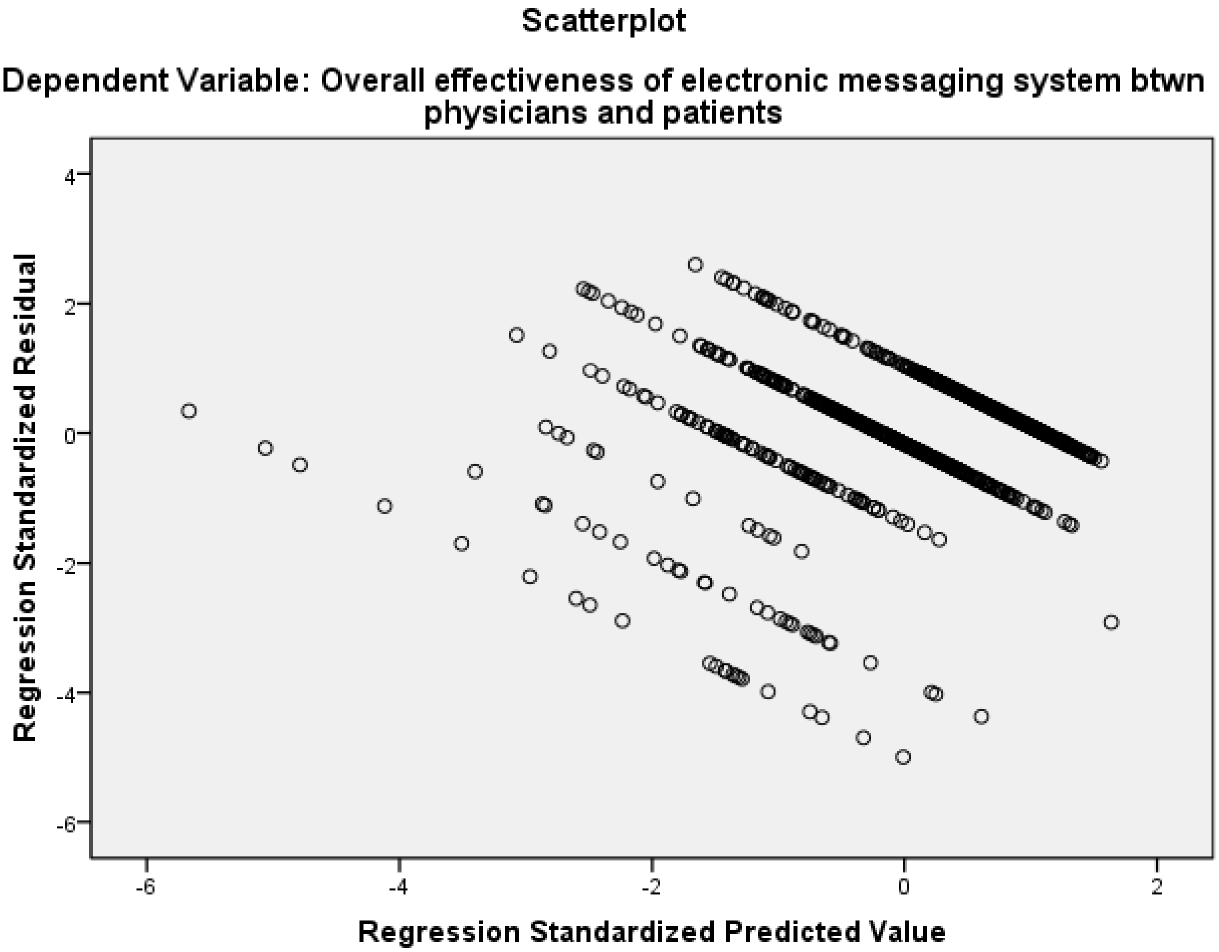


Figure 8. Scatterplot on effectiveness

Table 72. Patient regression transformed (value of r square) model summary

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.686[a]	.471	.463	.21608	2.118

a. Predictors: (Constant), q12 How many years physician has practiced medicine, q7_count4s Times email chosen as most effective, q3 How helpful email messages from physician in improving your health, q11 Gender, q1 How often send electronic messages to physician via HealthTrak, q8 How important to communicate w physician using electronic messaging in regard to health, q4 How promptly physician responds to message, q10 Age, q5 How often concerns resolved through email exchanges w/o face-to-face visit, q610to13mean, q2 How easy to send electronic messages to physician via HealthTrak, q14.2 Obtain info electronic messaging w physician, q61to9mean

b. Dependent Variable: recip_DV_reflect

Table 73. Patient regression transformed ANOVA

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.115	13	2.778	59.501	.000[a]
	Residual	40.527	868	.047		
	Total	76.643	881			

a. Predictors: (Constant), q12 How many years physician has practiced medicine, q7_count4s Times email chosen as most effective, q3 How helpful email messages from physician in improving your health, q11 Gender, q1 How often send electronic messages to physician via HealthTrak, q8 How important to communicate w physician using electronic messaging in regard to health, q4 How promptly physician responds to message, q10 Age, q5 How often concerns resolved through email exchanges w/o face-to-face visit, q610to13mean, q2 How easy to send electronic messages to physician via HealthTrak, q14.2 Obtain info electronic messaging w physician, q61to9mean

b. Dependent Variable: recip_DV_reflect

Table 74. Patient regression transformed coefficients (with Q8 having largest standardized coefficient and Q 4, 2, 5 having the next largest coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	-.730	.072		-10.151	.000
	q1 How often send electronic messages to physician via HealthTrak	.005	.014	.009	.340	.734
	q2 How easy to send electronic messages to physician via HealthTrak	.041	.009	.128	4.391	.000
	q3 How helpful email messages from physician in improving your health	-.002	.006	-.007	-.262	.793
	q4 How promptly physician responds to message	.044	.009	.140	5.009	.000
	q5 How often concerns resolved through email exchanges w/o face-to-face visit	.027	.006	.127	4.477	.000
	q61to9mean	.035	.012	.107	3.026	.003
	q610to13mean	.014	.007	.071	2.161	.031
	q7_count4s Times email chosen as most effective	.014	.004	.113	3.955	.000
	q8 How important to communicate w physician using electronic messaging in regard to health	.068	.006	.287	10.655	.000
	q10 Age	.012	.009	.035	1.328	.184
	q11 Gender	.022	.017	.033	1.300	.194
	q14.2 Obtain info electronic messaging w physician	.037	.010	.118	3.849	.000
	q12 How many years physician has practiced	-.002	.006	-.006	-.241	.810

	medicine					
a. Dependent Variable: recip_DV_reflect						

Table 75. Patient coefficients with collinearity statistics

Coefficients[a]			
Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	q1 How often send electronic messages to physician via HealthTrak	.868	1.152
	q2 How easy to send electronic messages to physician via HealthTrak	.716	1.396
	q3 How helpful email messages from physician in improving your health	.840	1.190
	q4 How promptly physician responds to message	.780	1.282
	q5 How often concerns resolved through email exchanges w/o face-to-face visit	.754	1.327
	q61to9mean	.488	2.048
	q610to13mean	.571	1.750
	q7_count4s Times email chosen as most effective	.746	1.340
	q8 How important to communicate w physician using electronic messaging in regard to health	.841	1.189
	q10 Age	.855	1.170
	q11 Gender	.937	1.067
	q14.2 Obtain info electronic messaging w	.648	1.544

	physician		
	q12 How many years physician has practiced medicine	.858	1.166
a. Dependent Variable: recip_DV_reflect			

Table 76. Patient Casewise Diagnostics

Casewise Diagnostics[a]					
Case Number		Std. Residual	recip_DV_ reflect	Predicted Value	Residual
_	806	-3.238	.33	1.0331	-.69977
a. Dependent Variable: recip_DV_reflect					

Table 77. Patient residual statistics

Residuals Statistics[a]					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-.3737	1.0821	.6925	.20247	882
Residual	-.69977	.58111	.00000	.21448	882
Std. Predicted Value	-5.266	1.924	.000	1.000	882
Std. Residual	-3.238	2.689	.000	.993	882
a. Dependent Variable: recip_DV_reflect					

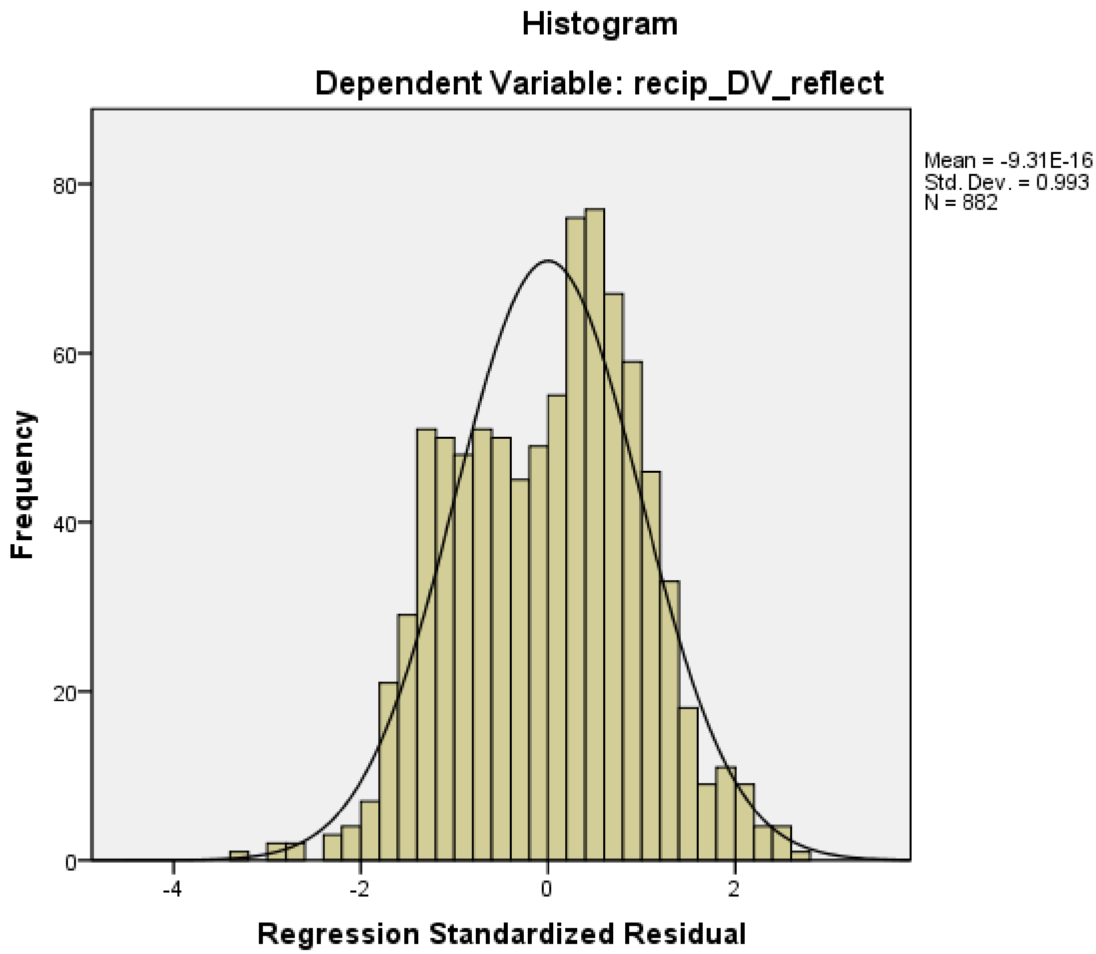


Figure 9. Patient charts transformed in histogram

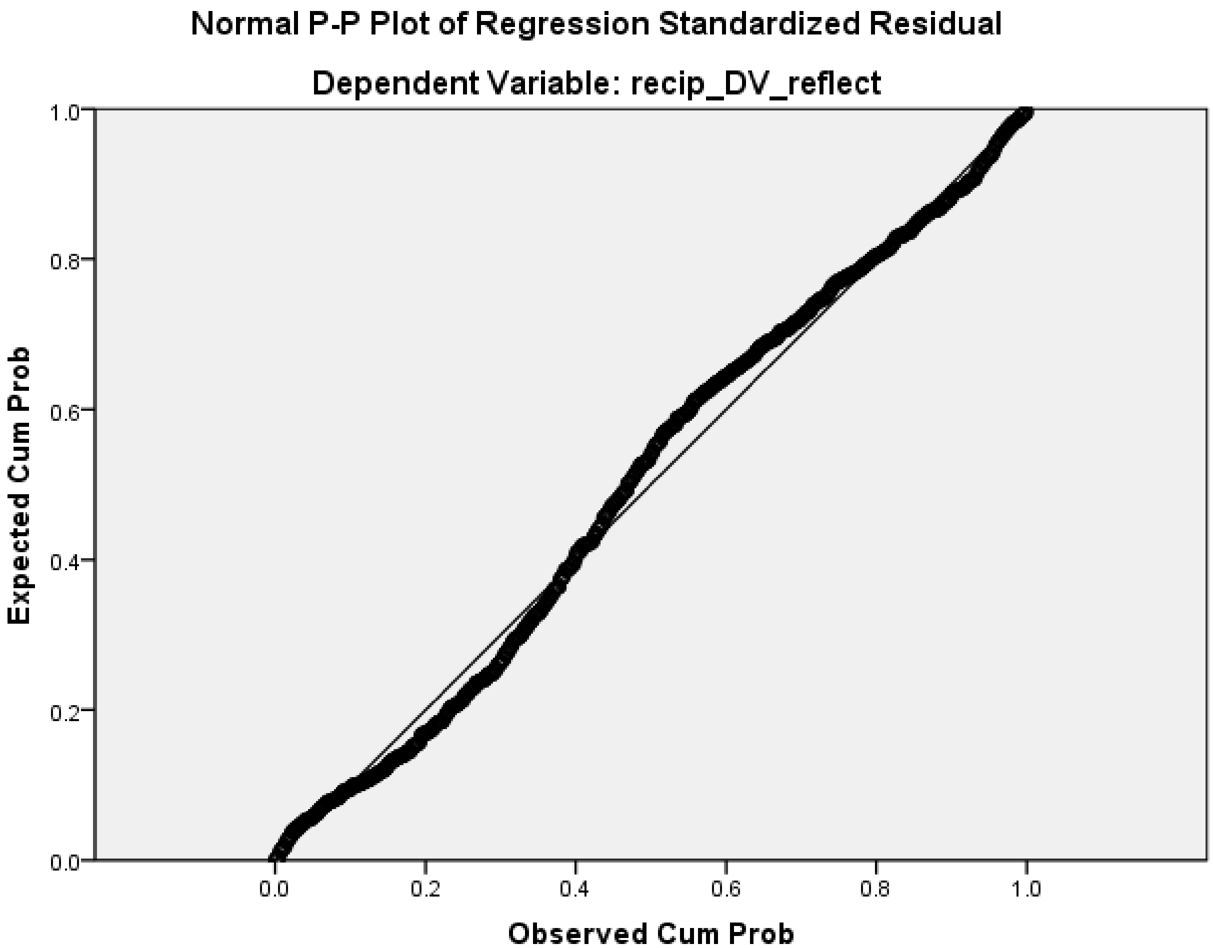


Figure 10. Patient charts transformed in normal P-P plot of regression standardized residual

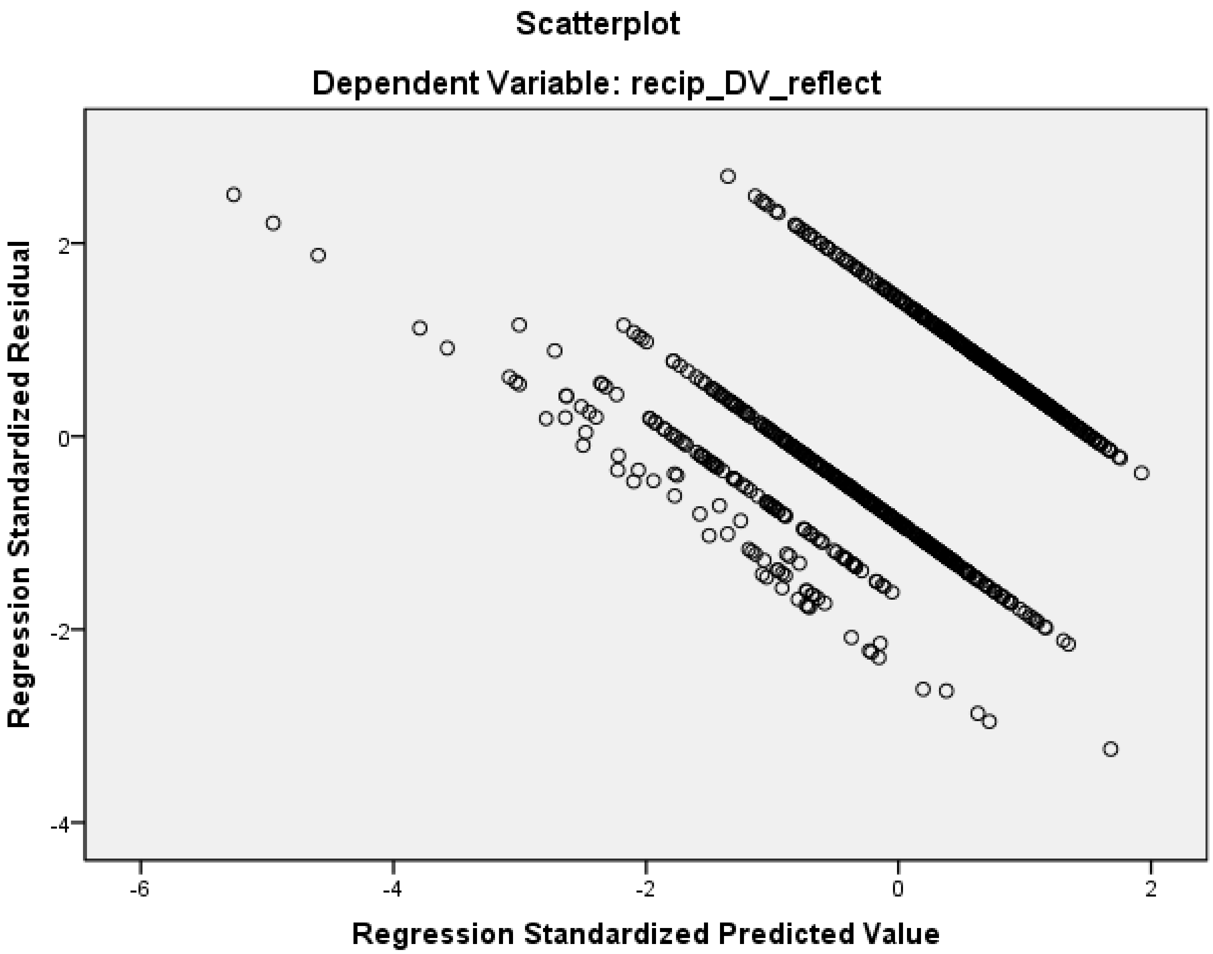


Figure 11. Patient charts transformed in scatterplot

D.4.2 Physician Survey Results

Table 78. Q1 physician frequencies on basic response to electronic messaging with patients on how often they communicate with patients using email via Healthtrak

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
2 Seldom	5	16.7	16.7	16.7
3 Occasion	6	20.0	20.0	36.7
4 Frequent	19	63.3	63.3	100.0
Total	30	100.0	100.0	

Table 79. Q2 physician frequencies on basic response to electronic messaging with patients on how often they initiate electronic messaging with patients

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Never	5	16.7	16.7	16.7
2 Seldom	4	13.3	13.3	30.0
3 Occasion	10	33.3	33.3	63.3
4 Frequent	11	36.7	36.7	100.0
Total	30	100.0	100.0	

Table 80. Q3 physician frequencies on basic response to electronic messaging with patients on how helpful email communication is with patients for improving their health

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
2 Mod Unhelpful	1	3.3	3.3	3.3
4 Mildly Helpful	11	36.7	36.7	40.0
5 Mod Helpful	9	30.0	30.0	70.0
6 Extrmly Helpful	9	30.0	30.0	100.0
Total	30	100.0	100.0	

Table 81. Q4 physician frequencies on basic response to electronic messaging with patients on how often they encourage patients to use electronic messaging

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Never	3	10.0	10.0	10.0
2 Rarely	3	10.0	10.0	20.0
3 Seldom	3	10.0	10.0	30.0
4 Often	8	26.7	26.7	56.7
5 Usually	11	36.7	36.7	93.3
6 Always	2	6.7	6.7	100.0
Total	30	100.0	100.0	

Table 82. Q5 physician frequencies on basic response to electronic messaging with patients on how promptly they are able to reply to patients

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 More than 48 hrs	2	6.7	6.9	6.9
	2 24-48 hrs	5	16.7	17.2	24.1
	3 Within 24 hrs	19	63.3	65.5	89.7
	4 Almost immediately	3	10.0	10.3	100.0
	Total	29	96.7	100.0	
Missing	System	1	3.3		
	Total	30	100.0		

Table 83. Q6 physician frequencies on basic response to electronic messaging with patients on how often patients concerns are resolved through email without a need for face-to-face visit

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Never	1	3.3	3.3	3.3
3 Seldom	3	10.0	10.0	13.3
4 Often	17	56.7	56.7	70.0
5 Usually	8	26.7	26.7	96.7
6 Always	1	3.3	3.3	100.0
Total	30	100.0	100.0	

Table 84. Q7.1 physician frequencies on effectiveness of reasons for using electronic messages when dealing with an emergency

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	22	73.3	73.3	73.3
2 Mod Ineffective	5	16.7	16.7	90.0
3 Mild Ineffectlve	2	6.7	6.7	96.7
4 Mild Effective	1	3.3	3.3	100.0
Total	30	100.0	100.0	

Table 85. Q7.2 physician frequencies on effectiveness of reasons for using electronic messages when responding to questions referring to medication usage

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
2 Mod Ineffective	1	3.3	3.3	3.3
3 Mild Ineffective	1	3.3	3.3	6.7
4 Mild Effective	3	10.0	10.0	16.7
5 Mod Effective	12	40.0	40.0	56.7
6 Totally Effective	13	43.3	43.3	100.0
Total	30	100.0	100.0	

Table 86. Q7.3 physician frequencies on effectiveness of reasons for using electronic messages when refilling a prescription

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	1	3.3	3.3	3.3
5 Mod Effective	6	20.0	20.0	23.3
6 Totally Effective	23	76.7	76.7	100.0
Total	30	100.0	100.0	

Table 87. Q7.4 physician frequencies on effectiveness of reasons for using electronic messages when responding to new, non-emergency health problems

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	1	3.3	3.3	3.3
3 Mild Ineffectlve	2	6.7	6.7	10.0
4 Mild Effective	16	53.3	53.3	63.3
5 Mod Effective	9	30.0	30.0	93.3
6 Totally Effective	2	6.7	6.7	100.0
Total	30	100.0	100.0	

Table 88. Q7.5 physician frequencies on effectiveness of reasons for using electronic messages when responding to follow-up questions relating to recent visits

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	1	3.3	3.3	3.3
3 Mild Ineffectlve	1	3.3	3.3	6.7
4 Mild Effective	1	3.3	3.3	10.0
5 Mod Effective	12	40.0	40.0	50.0
6 Totally Effective	15	50.0	50.0	100.0
Total	30	100.0	100.0	

Table 89. Q7.6 physician frequencies on effectiveness of reasons for using electronic messages when providing additional information about a medical condition

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
3 Mild Ineffectlve	4	13.3	13.3	13.3
4 Mild Effective	3	10.0	10.0	23.3
5 Mod Effective	14	46.7	46.7	70.0
6 Totally Effective	9	30.0	30.0	100.0
Total	30	100.0	100.0	

Table 90. Q7.7 physician frequencies on effectiveness of reasons for using electronic messages when reviewing lists of data on regularly monitored conditions

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	1	3.3	3.3	3.3
3 Mild Ineffectlve	1	3.3	3.3	6.7
4 Mild Effective	6	20.0	20.0	26.7
5 Mod Effective	10	33.3	33.3	60.0
6 Totally Effective	12	40.0	40.0	100.0
Total	30	100.0	100.0	

Table 91. Q7.8 physician frequencies on effectiveness of reasons for using electronic messages when responding to complex health-related problems

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	7	23.3	23.3	23.3
2 Mod Ineffective	12	40.0	40.0	63.3
3 Mild Ineffectlve	3	10.0	10.0	73.3
4 Mild Effective	7	23.3	23.3	96.7
5 Mod Effective	1	3.3	3.3	100.0
Total	30	100.0	100.0	

Table 92. Q7.9 physician frequencies on effectiveness of reasons for using electronic messages when responding to simple health-related problems

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
3 Mild Ineffectlve	2	6.7	6.7	6.7
4 Mild Effective	3	10.0	10.0	16.7
5 Mod Effective	13	43.3	43.3	60.0
6 Totally Effective	12	40.0	40.0	100.0
Total	30	100.0	100.0	

Table 93. Q7 physician descriptive statistics on effectiveness of reasons for using electronic messages

	N	Minimum	Maximum	Mean	Std. Deviation
Q7.1 Dealing with an emergency	30	1	4	1.40	.770
Q7.2 Responding to questions re medication usage	30	2	6	5.17	.986
Q7.3 Refilling prescription	30	1	6	5.63	.964
Q7.4 Responding to new non-emergency health problem	30	1	6	4.27	.944
Q7.5 Responding to follow-up question relating to recent visit	30	1	6	5.27	1.081
Q7.6 Providing additional information about a medical condition	30	3	6	4.93	.980
Q7.7 Reviewing lists of data on regularly monitored conditions	30	1	6	5.00	1.145
q7.8 Responding to complex health-related problem	30	1	5	2.43	1.194
q7.9 Responding to simple health-related problem	30	3	6	5.17	.874
Valid N (listwise)	30				

Table 94. Q7 physician descriptive statistics of effectiveness of reasons for using electronic messages high to low mean

	N	Minimum	Maximum	Mean	Std. Deviation
Q7.3 Refilling prescription	30	1	6	5.63	.964
Q7.5 Responding to follow-up question relating to recent visit	30	1	6	5.27	1.081
Q7.2 Responding to questions re medication usage	30	2	6	5.17	.986
Q7.7 Reviewing lists of data on regularly monitored conditions	30	1	6	5.00	1.145
Q7.6 Providing additional information about a medical condition	30	3	6	4.93	.980
Q7.4 Responding to new non-emergency health problem	30	1	6	4.27	.944
Q7.1 Dealing with an emergency	30	1	4	1.40	.770
Q7.8 Responding to complex health-related problem	30	1	5	2.43	1.194
Valid N (listwise)	30				

Table 95. Q8.1 physician frequencies on effectiveness of reasons for using electronic messages concerning emotional/relational issues when discussing patients' feelings as associated with health-related problems

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Ineffective	10	33.3	34.5	34.5
	2 Mod Ineffective	7	23.3	24.1	58.6
	4 Mild Effective	10	33.3	34.5	93.1
	5 Mod Effective	2	6.7	6.9	100.0
	Total	29	96.7	100.0	
Missing	System	1	3.3		
Total		30	100.0		

Table 96. Q8.2 physician frequencies on effectiveness of reasons for using electronic messages concerning emotional/relational issues when discussing relationship issues associated with patients' healthcare needs

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Ineffective	9	30.0	32.1	32.1
	2 Mod Ineffective	7	23.3	25.0	57.1
	3 Mild Ineffectlve	2	6.7	7.1	64.3
	4 Mild Effective	9	30.0	32.1	96.4
	5 Mod Effective	1	3.3	3.6	100.0
	Total	28	93.3	100.0	
Missing	System	2	6.7		
	Total	30	100.0		

Table 97. Q8.3 physician frequencies on effectiveness of reasons for using electronic messages concerning emotional/relational issues when discussing embarrassing medical or emotional health problems with patients

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Ineffective	9	30.0	32.1	32.1
	2 Mod Ineffective	5	16.7	17.9	50.0
	3 Mild Ineffectlve	3	10.0	10.7	60.7
	4 Mild Effective	10	33.3	35.7	96.4
	5 Mod Effective	1	3.3	3.6	100.0
	Total	28	93.3	100.0	
Missing	System	2	6.7		
	Total	30	100.0		

Table 98. Q8.4 physician frequencies on effectiveness of reasons for using electronic messages concerning emotional/relational issues when helping to establish doctor-patient relationships

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Extrmly Ineffective	2	6.7	7.1	7.1
	2 Mod Ineffective	4	13.3	14.3	21.4
	3 Mild Ineffectlve	1	3.3	3.6	25.0
	4 Mild Effective	8	26.7	28.6	53.6
	5 Mod Effective	8	26.7	28.6	82.1
	6 Totally Effective	5	16.7	17.9	100.0
	Total	28	93.3	100.0	
Missing	System	2	6.7		
	Total	30	100.0		

Table 99. Q8 physician descriptive statistics on effectiveness of reasons for using electronic messages concerning emotional/relationship issues

	N	Minimum	Maximum	Mean	Std. Deviation
Q8.1 Discussing patients feelings assoc w health-related problems	29	1	5	2.55	1.454
Q8.2 Discussing relationship issues assoc w patients health care needs	28	1	5	2.50	1.347
Q8.3 Discussing embarrassing medical or emotional health problem w patients	28	1	5	2.61	1.370
Q8.4 Helping establish doctor-patient relationship	28	1	6	4.11	1.524
Valid N (listwise)	28				

Table 100. Q9.1 physician frequency table on method (medium) of communication in light of being most effective for convenience

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Face-to-face	4	13.3	13.3	13.3
2 Phone Conversation	2	6.7	6.7	20.0
3 Phone Voice Message	1	3.3	3.3	23.3
4 Electronic Message	23	76.7	76.7	100.0
Total	30	100.0	100.0	

Table 101. Q9.2 physician frequency table on method (medium) of communication in light of being most effective for efficient use of the physician's time

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	6	20.0	20.7	20.7
	2 Phone Conversation	2	6.7	6.9	27.6
	4 Electronic Message	21	70.0	72.4	100.0
	Total	29	96.7	100.0	
Missing	System	1	3.3		
	Total	30	100.0		

Table 102. Q9.3 physician frequency table on method (medium) of communication in light of being most effective for efficient use of the patient's time

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Face-to-face	4	13.3	13.3	13.3
2 Phone Conversation	2	6.7	6.7	20.0
3 Phone Voice Message	1	3.3	3.3	23.3
4 Electronic Message	23	76.7	76.7	100.0
Total	30	100.0	100.0	

Table 103. Q9.4 physician frequency table on method (medium) of communication in light of being most effective for patient satisfaction

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	19	63.3	65.5	65.5
	2 Phone Conversation	8	26.7	27.6	93.1
	4 Electronic Message	2	6.7	6.9	100.0
	Total	29	96.7	100.0	
Missing	System	1	3.3		
	Total	30	100.0		

Table 104. Q9.5 physician frequency table on method (medium) of communication in light of being most effective for confidentiality

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	20	66.7	69.0	69.0
	3 Phone Voice Message	1	3.3	3.4	72.4
	4 Electronic Message	8	26.7	27.6	100.0
	Total	29	96.7	100.0	
Missing	System	1	3.3		
	Total	30	100.0		

Table 105. Q9.6 physician frequency table on method (medium) of communication in light of being most effective for cost effectiveness

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	6	20.0	21.4	21.4
	2 Phone Conversation	2	6.7	7.1	28.6
	3 Phone Voice Message	2	6.7	7.1	35.7
	4 Electronic Message	18	60.0	64.3	100.0
	Total	28	93.3	100.0	
Missing	System	2	6.7		
	Total	30	100.0		

Table 106. Q9.7 physician frequency table on method (medium) of communication in light of being most effective clinically

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1 Face-to-face	26	86.7	89.7	89.7
	2 Phone Conversation	2	6.7	6.9	96.6
	4 Electronic Message	1	3.3	3.4	100.0
	Total	29	96.7	100.0	
Missing	System	1	3.3		
	Total	30	100.0		

Table 107. Q9.8 physician frequency table on method (medium) of communication in light of being most effective for information/education

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Face-to-face	24	80.0	80.0	80.0
2 Phone Conversation	3	10.0	10.0	90.0
4 Electronic Message	3	10.0	10.0	100.0
Total	30	100.0	100.0	

Table 108. Q9.9 physician frequency table on method (medium) of communication in light of being most effective for establishing a relationship with the patient

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Face-to-face	28	93.3	93.3	93.3
2 Phone Conversation	2	6.7	6.7	100.0
Total	30	100.0	100.0	

Table 109. Q10 physician frequency table on how important it is to communicate with the patient using electronic messaging in regard to health

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
3 Mild Unimportant	2	6.7	6.7	6.7
4 Mild Important	13	43.3	43.3	50.0
5 Mod Important	11	36.7	36.7	86.7
6 Extrmly Important	4	13.3	13.3	100.0
Total	30	100.0	100.0	

Table 110. Q11 physician frequency table on overall effectiveness of electronic messaging system between physicians and patients

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Ineffective	2	6.7	6.7	6.7
3 Mild Ineffectlve	1	3.3	3.3	10.0
4 Mild Effective	7	23.3	23.3	33.3
5 Mod Effective	16	53.3	53.3	86.7
6 Totally Effective	4	13.3	13.3	100.0
Total	30	100.0	100.0	

Table 111. Q12 physician frequency table on how much effectiveness has changed over time concerning electronic messaging with physicians and patients

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
2 More ineffective	2	6.7	6.7	6.7
4 Somewhat more effective	14	46.7	46.7	53.3
5 More effective	10	33.3	33.3	86.7
6 Much more effective	4	13.3	13.3	100.0
Total	30	100.0	100.0	

Table 112. Q10, Q11, Q12 physician descriptive statistics on importance, effectiveness and change over time when using electronic messaging with physicians

	N	Minimum	Maximum	Mean	Std. Deviation
Q10 How important to communicate w patient using electronic messaging in regard to health	30	3	6	4.57	.817
Q11 Overall effectiveness of electronic messaging system btwn physicians and patients	30	1	6	4.57	1.194
Q12 How has effectiveness changed over time	30	2	6	4.47	.973
Valid N (listwise)	30				

Table 113. Q13 physician frequency table on age demographics

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
2 30-49	24	80.0	80.0	80.0
3 50-64	6	20.0	20.0	100.0
Total	30	100.0	100.0	

Table 114. Q14 physician frequency table on gender demographics

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Male	10	33.3	33.3	33.3
2 Female	20	66.7	66.7	100.0
Total	30	100.0	100.0	

Table 115. Q15 physician frequency table on how many hours per week the physician sees outpatients

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 0-8	10	33.3	33.3	33.3
2 9-16	10	33.3	33.3	66.7
3 17-32	9	30.0	30.0	96.7
4 33 and over	1	3.3	3.3	100.0
Total	30	100.0	100.0	

Table 116. Q16 physician frequency table on the number of years since graduating from medical school

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Less than 5	1	3.3	3.3	3.3
2 5 to 9	6	20.0	20.0	23.3
3 10 to 14	9	30.0	30.0	53.3
4 15 to 19	7	23.3	23.3	76.7
5 20 and over	7	23.3	23.3	100.0
Total	30	100.0	100.0	

Table 117. Q17 physician frequency table on number of years that physician has communicated with patients using electronic messaging

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Less than 5	21	70.0	70.0	70.0
2 5 to 9	9	30.0	30.0	100.0
Total	30	100.0	100.0	

Table 118. Q18.1 physician frequency table on how physicians think patients obtain healthcare information when conversing with physicians

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
4 Mild Likely	4	13.3	13.3	13.3
5 Mod Likely	6	20.0	20.0	33.3
6 Extrmly Likely	20	66.7	66.7	100.0
Total	30	100.0	100.0	

Table 119. Q18.2 physician frequency table on how physicians think patients obtain healthcare information when communicating with friends and family

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
5 Mod Likely	6	20.0	20.0	20.0
6 Extrmly Likely	24	80.0	80.0	100.0
Total	30	100.0	100.0	

Table 120. Q18.3 physician frequency table on how physicians think patients obtain healthcare information when using the radio or television

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
3 Mild Likely	1	3.3	3.3	3.3
4 Mild Likely	9	30.0	30.0	33.3
5 Mod Likely	9	30.0	30.0	63.3
6 Extrmly Likely	11	36.7	36.7	100.0
Total	30	100.0	100.0	

Table 121. Q18.4 physician frequency table on how physicians think patients obtain healthcare information when reading blogs on the Internet

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
2 Mod Likely	2	6.7	6.7	6.7
3 Mild Likely	4	13.3	13.3	20.0
4 Mild Likely	8	26.7	26.7	46.7
5 Mod Likely	14	46.7	46.7	93.3
6 Extrmly Likely	2	6.7	6.7	100.0
Total	30	100.0	100.0	

Table 122. Q18.5 physician frequency table on how physicians think patients obtain healthcare information when using Google, WebMD, or other search engines

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
4 Mild Likely	3	10.0	10.0	10.0
5 Mod Likely	13	43.3	43.3	53.3
6 Extrmly Likely	14	46.7	46.7	100.0
Total	30	100.0	100.0	

Table 123. Q18 physician descriptive statistics on how patients likely obtain healthcare information

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Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
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	Elapsed Time	00:00:00.000

	N	Minimum	Maximum	Mean	Std. Deviation
Q18.1 Seek info conversing w physician	30	4	6	5.53	.730
Q18.2 Seek info communicating w friends and family	30	5	6	5.80	.407
Q18.3 Seek info reading print media	30	3	6	5.23	.817
Q18.4 Seek info through radio or television	30	3	6	5.00	.910
Q18.5 Seek info reading blogs on Internet	30	2	6	4.33	1.028
Q18.6 Seek info using Google, WebMD, or other search engines	30	4	6	5.37	.669
Valid N (listwise)	30				

Table 124. Q18 physician descriptive statistics on how patients likely obtain healthcare information with high to low mean

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Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=q18.1 q18.2 q18.3 q18.4 q18.5 q18.6 /STATISTICS=MEAN STDDEV MIN MAX /SORT=MEAN (D).
Resources	Processor Time	00:00:00.000
	Elapsed Time	00:00:00.000

	N	Minimum	Maximum	Mean	Std. Deviation
Q18.2 Seek info communicating w friends and family	30	5	6	5.80	.407
Q18.1 Seek info conversing w physician	30	4	6	5.53	.730
Q18.6 Seek info using Google, WebMD, or other search engines	30	4	6	5.37	.669
Q18.3 Seek info reading print media	30	3	6	5.23	.817

Q18.4 Seek info through radio or television	30	3	6	5.00	.910
Q18.5 Seek info reading blogs on Internet	30	2	6	4.33	1.028
Valid N (listwise)	30				

Table 125. Q19.1 physician frequencies on how physicians themselves likely obtain healthcare information by discussing with other physicians

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
2 Mod Likely	1	3.3	3.3	3.3
5 Mod Likely	6	20.0	20.0	23.3
6 Extrmly Likely	23	76.7	76.7	100.0
Total	30	100.0	100.0	

Table 126. Q19.2 physician frequencies on how physicians themselves likely obtain healthcare information by reading professional journals or books

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
5 Mod Likely	10	33.3	33.3	33.3
6 Extrmly Likely	20	66.7	66.7	100.0
Total	30	100.0	100.0	

Table 127. Q19.3 physician frequencies on how physicians themselves likely obtain healthcare information by reading popular print media

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Unlikely	5	16.7	16.7	16.7
2 Mod Likely	8	26.7	26.7	43.3
3 Mild Likely	4	13.3	13.3	56.7
4 Mild Likely	5	16.7	16.7	73.3
5 Mod Likely	8	26.7	26.7	100.0
Total	30	100.0	100.0	

Table 128. Q19.4 physician frequencies on how physicians themselves likely obtain healthcare information by listening to radio or watching television

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Unlikely	9	30.0	30.0	30.0
2 Mod Likely	7	23.3	23.3	53.3
3 Mild Likely	5	16.7	16.7	70.0
4 Mild Likely	5	16.7	16.7	86.7
5 Mod Likely	4	13.3	13.3	100.0
Total	30	100.0	100.0	

Table 129. Q19.5 physician frequencies on how physicians themselves likely obtain healthcare information by reading blogs on the Internet

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Unlikely	17	56.7	56.7	56.7
2 Mod Likely	4	13.3	13.3	70.0
3 Mild Likely	4	13.3	13.3	83.3
4 Mild Likely	5	16.7	16.7	100.0
Total	30	100.0	100.0	

Table 130. Q19.6 physician frequencies on how physicians themselves likely obtain healthcare information by using Google, WebMD, or other search engines

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1 Extrmly Unlikely	3	10.0	10.0	10.0
2 Mod Likely	1	3.3	3.3	13.3
3 Mild Likely	2	6.7	6.7	20.0
4 Mild Likely	3	10.0	10.0	30.0
5 Mod Likely	6	20.0	20.0	50.0
6 Extrmly Likely	15	50.0	50.0	100.0
Total	30	100.0	100.0	

Table 131. Q19 physician descriptive statistics on how physicians themselves likely obtain healthcare information

	N	Minimum	Maximum	Mean	Std. Deviation
Q19.2 Seek info reading professional journals, books	30	5	6	5.67	.479
Q19.1 Seek info discussing w other physicians	30	2	6	5.67	.802
Q19.6 Seek info using Google, WebMD, or other search engine	30	1	6	4.77	1.675
Q19.3 Seek info reading popular print media	30	1	5	3.10	1.494
Q19.4 Seek info through radio or television	30	1	5	2.60	1.429
Q19.5 Seek info reading blogs on Internet	30	1	4	1.90	1.185
Valid N (listwise)	30				

Table 132. Q19 physician descriptive statistics on how physicians themselves likely obtain healthcare information high to low mean

	N	Minimum	Maximum	Mean	Std. Deviation
Q19.2 Seek info reading professional journals, books	30	5	6	5.67	.479
Q19.1 Seek info discussing w other physicians	30	2	6	5.67	.802
Q19.6 Seek info using Google, WebMD, or other search engine	30	1	6	4.77	1.675
Q19.3 Seek info reading popular print media	30	1	5	3.10	1.494
Q19.4 Seek info through radio or television	30	1	5	2.60	1.429
Q19.5 Seek info reading blogs on Internet	30	1	4	1.90	1.185
Valid N (listwise)	30				

Table 133. Q20 physician frequencies for overall efficacy of electronic messaging between physicians and patients as an effective means for conducting healthcare

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	29	96.7	96.7	96.7
No	1	3.3	3.3	100.0
Total	30	100.0	100.0	

Table 134. Q11 physician overall correlations on overall effectiveness of electronic messaging between physicians and patients Q1-19

		q11 Overall effectiveness of electronic messaging system btwn physicians and patients
q1 How often communicate w patients using email via HealthTrak	Pearson Correlation	.598**
	Sig. (2-tailed)	
	N	30
q2 How often initiate electronic messaging w patients	Pearson Correlation	.652**
	Sig. (2-tailed)	.000
	N	30
q3 How helpful email communication w patients in improving their health	Pearson Correlation	.640**
	Sig. (2-tailed)	.000
	N	30
q4 How often encourage patients to use electronic messaging	Pearson Correlation	.653**
	Sig. (2-tailed)	.000
	N	30

q5 How promptly able to reply to patients	Pearson Correlation	.265
	Sig. (2-tailed)	.165
	N	29
q6 How often patients concerns resolved thru email w/o need for face-to-face visit	Pearson Correlation	.152
	Sig. (2-tailed)	.423
	N	30
q7_mean	Pearson Correlation	.514**
	Sig. (2-tailed)	.004
	N	30
q8_mean	Pearson Correlation	.321
	Sig. (2-tailed)	.089
	N	29
q9_count4s num times email chosen most effective	Pearson Correlation	.202
	Sig. (2-tailed)	.284
	N	30
q13 Age	Pearson Correlation	-.028
	Sig. (2-tailed)	.882
	N	30
q14 Gender	Pearson Correlation	.281
	Sig. (2-tailed)	.133
	N	30
q15 How many hours per week see outpatients	Pearson Correlation	-.245
	Sig. (2-tailed)	.191
	N	30
q16 Years since graduating from medical school	Pearson Correlation	-.059
	Sig. (2-tailed)	.758
	N	30
q17 Years communicating w patients using electronic messaging	Pearson Correlation	.304
	Sig. (2-tailed)	.103
	N	30
q18.1 Seek info conversing w physician	Pearson Correlation	-.121
	Sig. (2-tailed)	.523
	N	30
q18.2 Seek info communicating w friends and family	Pearson Correlation	-.043
	Sig. (2-tailed)	.823
	N	30

q18.3 Seek info reading print media	Pearson Correlation	.072
	Sig. (2-tailed)	.706
	N	30
q18.4 Seek info through radio or television	Pearson Correlation	.127
	Sig. (2-tailed)	.504
	N	30
q18.5 Seek info reading blogs on Internet	Pearson Correlation	.009
	Sig. (2-tailed)	.961
	N	30
q18.6 Seek info using Google, WebMD, or other search engines	Pearson Correlation	.119
	Sig. (2-tailed)	.530
	N	30
q19.1 Seek info discussing w other physicians	Pearson Correlation	-.120
	Sig. (2-tailed)	.528
	N	30
q19.2 Seek info reading professional journals, books	Pearson Correlation	-.321
	Sig. (2-tailed)	.084
	N	30
q19.3 Seek info reading popular print media	Pearson Correlation	-.207
	Sig. (2-tailed)	.273
	N	30
q19.4 Seek info through radio or television	Pearson Correlation	-.024
	Sig. (2-tailed)	.899
	N	30
q19.5 Seek info reading blogs on Internet	Pearson Correlation	.066
	Sig. (2-tailed)	.730
	N	30
q19.6 Seek info using Google, WebMD, or other search engine	Pearson Correlation	.051
	Sig. (2-tailed)	.788
	N	30

**. Correlation is significant at the 0.01 level (2-tailed).

Table 135. Physician correlations among predictors

		q1 How often communicate w patients using email via HealthTrak	q2 How often initiate electronic messaging w patients	q3 How helpful email communication w patients in improving their health	q4 How often encourage patients to use electronic messaging	q5 How promptly able to reply to patients	q6 How often patients concerns resolved thru email w/o need for face-to-face visit	q7_ mean
q1 How often communicate w patients using email via HealthTrak	Pearson Correlation							
	Sig. (2-tailed)							
	N	30						
q2 How often initiate electronic messaging w patients	Pearson Correlation	.788**						
	Sig. (2-tailed)	.000						
	N	30	30					
q3 How helpful email communication w patients in improving their health	Pearson Correlation	.601**	.592**	1				
	Sig. (2-tailed)	.000	.001					
	N	30	30					
q4 How often encourage patients to use	Pearson Correlation	.811**	.756**	.641**	1			
	Sig. (2-tailed)	.000	.000	.000				

electronic messaging	N	30	30	30				
q5 How promptly able to reply to patients	Pearson Correlation	.007	.037	.257	-.072	1		
	Sig. (2-tailed)	.972	.848	.178	.710			
	N	29	29	29	29			
q6 How often patients concerns resolved thru email w/o need for face-to-face visit	Pearson Correlation	.105	.119	.532**	.064	.367		
	Sig. (2-tailed)	.579	.531	.003	.739	.050		
	N	30	30	30	30	29		
q7_mean	Pearson Correlation	.404*	.496**	.666**	.646**	.166	.537**	
	Sig. (2-tailed)	.027	.005	.000	.000	.389	.002	
	N	30	30	30	30	29	30	
		Q1	Q2	Q3	Q4	Q5	Q6	Q7
q8_mean	Pearson Correlation	.273	.355	.230	.525**	-.132	.229	.569**
	Sig. (2-tailed)	.152	.059	.230	.003	.496	.232	.001
	N	29	29	29	29	29	29	29
q9_count4 some times email chosen most effective	Pearson Correlation	.309	.512**	.181	.232	.070	.017	.211
	Sig. (2-tailed)	.097	.004	.340	.218	.719	.930	.262
	N	30	30	30	30	29	30	30

q10 How important to communi-cate w patient using electronic messaging in regard to health	Pearson Correla-tion	.439*	.490**	.592**	.458*	.210	.222	.370*
	Sig. (2-tailed)	.015	.006	.001	.011	.275	.238	.044
	N	30	30	30	30	29	30	30
q13 Age	Pearson Correla-tion	.131	-.031	.000	.035	.267	.113	-.024
	Sig. (2-tailed)	.490	.871	1.000	.854	.161	.552	.900
	N	30	30	30	30	29	30	30
q14 Gender	Pearson Correla-tion	.247	.263	.024	.348	-.414*	-.213	.187
	Sig. (2-tailed)	.188	.160	.898	.060	.026	.258	.322
	N	30	30	30	30	29	30	30
q15 How many hours per week see outpatients	Pearson Correla-tion	.027	-.067	-.111	-.212	-.152	.210	-.290
	Sig. (2-tailed)	.889	.724	.558	.262	.432	.266	.119
	N	30	30	30	30	29	30	30
q16 Years since graduating from medical school	Pearson Correla-tion	.188	.089	.065	.170	.070	.009	-.044
	Sig. (2-tailed)	.319	.639	.733	.370	.717	.963	.816
	N	30	30	30	30	29	30	30

q17 Years communi-cating w patients using electronic messaging	Pearson Correla-tion	.267	.196	.188	.455*	.090	-.016	.323
	Sig. (2-tailed)	.154	.299	.321	.012	.642	.931	.082
	N	30	30	30	30	29	30	30

		Q8	Q9	Q10	Q13	Q14	Q15	Q16
q8_mean	Pearson Correlation	1						
	Sig. (2-tailed)							
	N							
q9_count4s num times email chosen most effective	Pearson Correlation	.119	1					
	Sig. (2-tailed)	.538						
	N	29						
q10 How important to communicate w patient using electronic messaging in regard to health	Pearson Correlation	.198	.227	1				
	Sig. (2-tailed)	.304	.228					
	N	29	30					
q13 Age	Pearson Correlation	-.243	.055	-.041	1			
	Sig. (2-tailed)	.204	.772	.828				
	N	29	30	30	30			
q14 Gender	Pearson Correlation	.335	.078	.147	-.354	1		
	Sig. (2-tailed)	.076	.682	.439	.055			
	N	29	30	30	30			
q15 How many hours per week see outpatients	Pearson Correlation	-.196	-.238	-.169	-.019	.027	1	
	Sig. (2-tailed)	.308	.206	.372	.920	.888		
	N	29	30	30	30	30		
q16 Years since	Pearson	-.192	.114	-.231	.684**	-.165	-.181	1

graduating from medical school	Correlation							
	Sig. (2-tailed)	.318	.548	.220	.000	.385	.339	
	N	29	30	30	30	30	30	
q17 Years communicating w patients using electronic messaging	Pearson Correlation	.129	.213	-.009	.036	.154	-.191	.133
	Sig. (2-tailed)	.506	.258	.962	.849	.416	.311	.482
	N	29	30	30	30	30	30	30

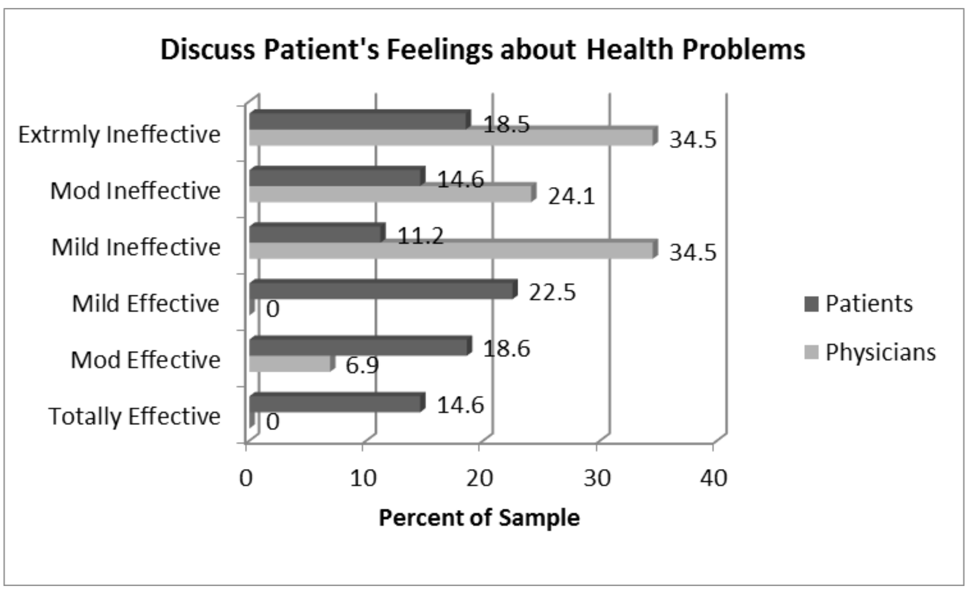

Figure 12. Comparison of physician/patient perceptions of discussing patient feelings about health problems through electronic messaging

Table 136. Q6.10 for patients and Q8.1 for physicians on effectiveness of discussing patient feelings about health problems through electronic messaging

Question 6.10 for Patients and Question 8.1 for Physicians

	Patients	Physicians
Extrmly Ineffective	18.5	34.5
Mod Ineffective	14.6	24.1
Mild Ineffective	11.2	34.5
Mild Effective	22.5	0
Mod Effective	18.6	6.9
Totally Effective	14.6	0

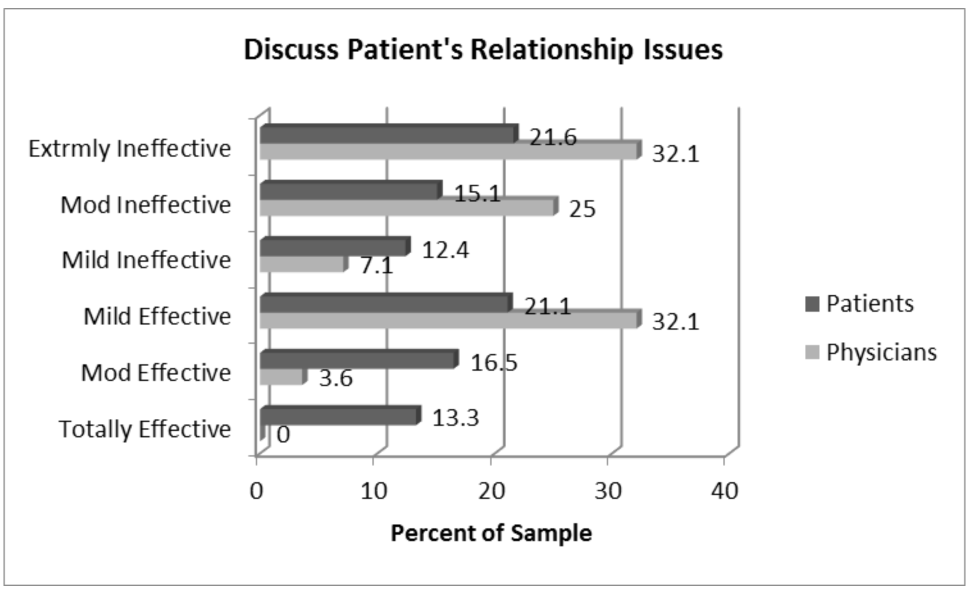

Figure 13. Comparison of physician/patient perceptions of discussing patient relationship issues through electronic messaging

Table 137. Q6.11 for patients and Q8.2 for physicians perceived efficacy for online communication when discussing relationship issues

	Patients	Physicians
Extrmly Ineffective	21.6	32.1
Mod Ineffective	15.1	
Mild Ineffective	12.4	7.1
Mild Effective	21.1	32.1
Mod Effective	16.5	3.6
Totally Effective	13.3	0

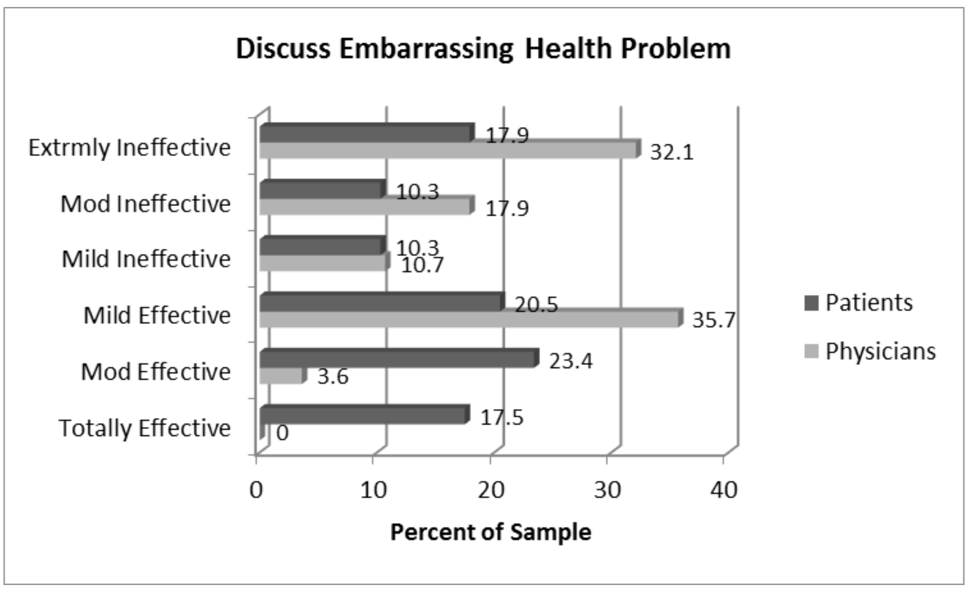

Figure 14. Comparison of physician/patient perceptions of discussing patient embarrassing health problems through electronic messaging

Table 138. Q6.12 for patients and Q8.3 for physicians comparing perceived efficacy when discussing embarrassing health problems online between physicians and patients

Question 6.12 for Patients and Question 8.3 for Physicians		
	Patients	Physicians
Extrmly Ineffective	17.9	32.1
Mod Ineffective	10.3	17.9
Mild Ineffective	10.3	10.7
Mild Effective	20.5	35.7
Mod Effective	23.4	3.6
Totally Effective	17.5	0

Table 139. Q21 Physician Survey Qualitative Results

Q21 In one sentence, please state the main weaknesses of electronic messaging between physicians and patients. (26 answered 3 skipped).

1. Added time burdenPH on physicians; there is no time factored into physician schedules for the additional work of responding to emails.
2. Confidentiality and confirming that the patient has received the message.
3. I think the turnaround time is quite variable and delays could be frustrating to patients although not much different from phone messages.
4. There is no limit to the number of words they can use.
5. Inappropriate use by patients of issues that should be handled by phone or visit.
6. I don’t think that patients often realize that what they write in their message will end up in their permanent medical record.
7. My patient panel rarely checks their messages in Healthtrack.
8. too easy to cause misunderstandings; unable to get immediate feedback regarding how the other person is interpreting the information or whether they are understanding the information.

	9. limited in patients without computer access or elderly patients; patients expect rapid turn-around time for response which sometimes can be difficult to do
	10. only brief messages and can only provide simple, good and/or neutral information exchange on non-urgent issues,
	11. if used inappropriately for an emergency
	12. Missing non-verbal cues.
	13.
	14. Patients sometimes send semi-urgent questions/issues via electronic messaging — even when the messaging specifically is for NONURGENT matters. That does delay appropriate care.
	15. Patients don't always check their messages in a timely fashion or don't know their password to access the communication.
	16. Patients sometimes expect a more timely and detailed electronic response than I feel is appropriate; it is not a substitute for an office visit.
	17. Oftentimes the amount of explanation needed is too long, and you need the body language of the patient to make sure they understand it.
	18. Lack of access of many of my patients to internet and that often patients do not read the emails when I try to use healthtrak to follow up with them.
	19. We do not get reimbursed for it, and many of my patients do not have access to the internet or decline HealthTrak
	20. Some pts don't use it
	21. my patients don't look at my communications
	22. Lack of non-verbal context.
	23. Lack of nurse screening

	24. Messages don’t come directly to me and are filtered by nurse, causing delay in my reply (usually by one day).
	25. You miss the opportunity to examine the patient or see the visual cues that are important in both medical and psychological problems; problems other than this can be handled by a non-physician person and my time could be used elsewhere besides the computer.
	26. In complex situations, you need to just pick up the phone to have a dialogue.

Table 140. Q22 physician survey quantitative results

Q22 In one sentence, please state the main strengths of electronic messaging between physicians and patients. (25 answered 4 skipped).

1. It is a very convenient way for patients to communicate directly with their physicians regarding their health concerns.
2. Documentation and convenience to address simple problems and questions.
3. It eliminates phone tag, allows patients to review what you said so they can be sure to understand or ask for clarification not to mention documents exactly what was told to the patient.
4. Convenient for both physician and patient.
5. Easily answerable questions which don’t require additional layers of questioning can be easily answered and for tracking blood pressures, glucoses, labs.
6. Patient’s can’t waste your time rambling on about how their aunts coffee cake caused their back pain.
7. The communication (at least one way) can occur any time of day—not isolated to business hours.
8. convenient, useful, efficient

9. convenience
10. convenience and cost-efficiency
11. Speed and convenience.
12.
13. convenience! Ease of messaging!
14. Ease of use and ability to message at time convenient to me.
15. Electronic messaging is a very effective and efficient means for transmitting non-urgent messages regarding results or questions between patients and physicians.
16. It is great for quick things like medication dose adjustments, relating labs, med refills.
17. Questions received from my patients via Healthtrac are very convenient for me to answer.
18. It saves time and resources; I use it mainly to notify Pt's about results. This way, I don't have to ask my staff to mail a letter which costs time and money)
19. Very convenient
20. speed, capture of exactly what was said. (also a problem, because to type an entire drug add of warnings isn't possible, but could be covered more easily by conversation)
21. Ability to think through answers both when giving and receiving.
22. Easy access for patients
23. Convenience, convenience, convenience.
24. Convenience of answering during down-time.
25. It's efficient, convenient, and answers a lot of questions

Table 141. Q23 physician survey qualitative results

Q23 Is there any one case that stands out in your mind in using electronic messaging with your patients? Please describe but do not include your name or the name of any other person in your response. (14 answered, 15 skipped).

1.	I had a patient with a fairly straightforward situation I was able to provide an answer and appropriate prescription. He loved it.	Fri, Jan 14, 2011 3:31 PM	Find…
2.	recent request for malaria prophylaxis could easily be handled over the internet.	Tue, Jan 11, 2011 5:38 PM	Find…
3.	I have emailed patients who are signed up with health track numerous times with lab results (mainly 598onversatio) and specific instructions for diet with web links and a month later I get a signal in Epicare that they haven't read the message and I have to end up calling them anyway. Waste of my time. I've had a couple of patients flood me with questions via email about every ache and pain and skin spot they notice. At least with a clinic visit they are limited by time. But when they email me through healthtrack, they are free to email incessantly.	Mon, Jan 10, 2011 9:43 AM	Find…
4.	no, not really	Thu, Jan 6, 2011 3:57 PM	Find…
5.	Several cases of patients asking about immunization status, getting replies after hours, and being able to get their immunizations first thing in the morning.	Thu, Jan 6, 2011 12:15 PM	Find…
6.	.	Thu, Jan 6, 2011 11:51 AM	Find…
7.	Yes. One patient who over-uses electronic messaging to relay every piece of medical information that comes to her mind including: description of visits with other providers, tests done, past medical information that she believes is important for me to know, medical questions, descriptions of symptoms, etc. For her, I wish there was a limit to the	Thu, Jan 6, 2011 9:07 AM	Find…

	number of messages she is allowed to send through health track. The number of messages and most of the time the content, is annoying to have to handle throughout my work day and also makes it difficult to search through her record to find pertinent conversations or interactions where decisions in her medical care were made.		
8.	A case that stands out in my mind as being Ineffective is one in which a patient was messaging regarding her heavy vaginal bleeding, expecting an urgent response. This should have been a call to our nurses, or even possibly an emergency room visit. It is also difficult if patients do not check or respond to their emails.	Tue, Jan 4, 2011 9:32 AM	Find…
9.	Yes, one patient emails all the time and her problems are complex. More than 50% of the time I have to call her directly. Often the call is something a nurse could do. It is inefficient for me. I don't think it saves the patient anytime either.	Mon, Jan 3, 2011 12:44 PM	Find…
10.	No, but I have received some very nice feedback from patients, via healthtrak, about my care; which I find to be a boost.	Thu, Dec 23, 2010 9:04 PM	Find…
11.	No	Wed, Dec 22, 2010 6:25 PM	Find…
12.	No.	Wed, Dec 22, 2010 5:10 PM	Find…
13.	No. Mainly used for routine care.	Wed, Dec 22, 2010 4:47 PM	Find…
14.	Patient was very upset about how a form was filled out and railed in health-trak. Really needed to be an in person (599onversat) 599onversation but she was hard to reach so done via email. Most unsatisfactory.		

APPENDIX E

DATA MINING PROJECT

E.1 LENGTH OF QUALIFIYING MESSAGES

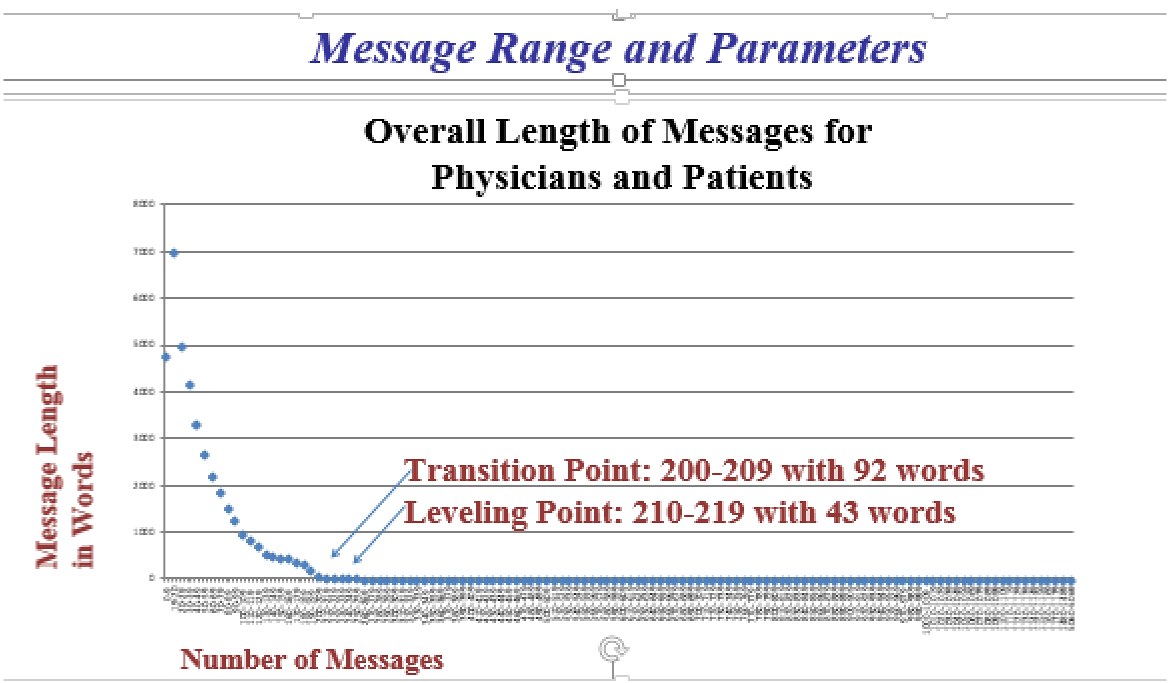

Figure 15. Length of qualifying messages for content analysis work

E.2 SAMPLE DATA RESULTS FOR GENDER AND USE OF EXCLAMATION POINTS

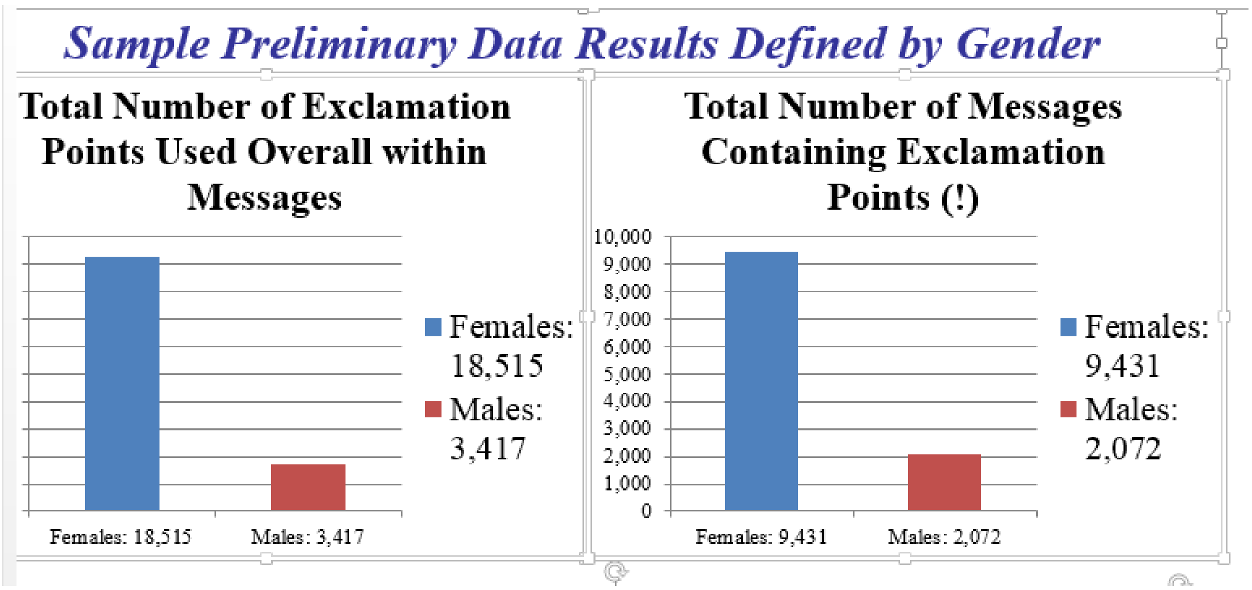

Figure 16. Sample data results for gender and use of exclamation points for content analysis

E.3 DICTIONARY LIST

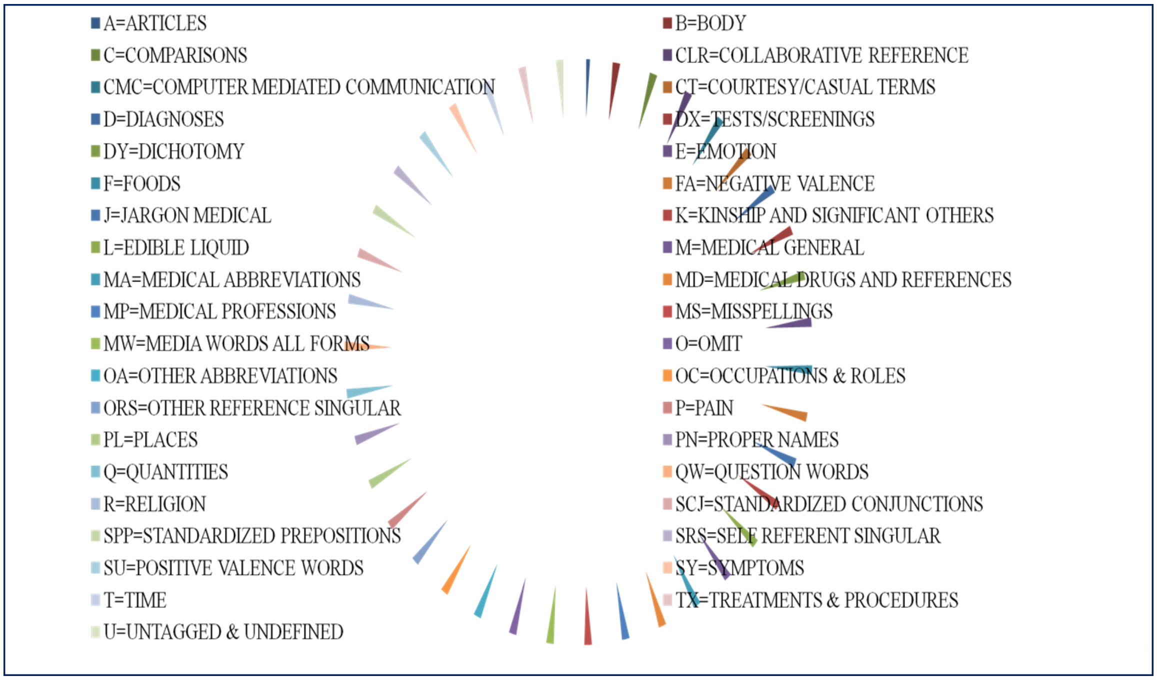

Figure 17. List of dictionaries for content analysis

E.4 VISUAL DISPLAY OF MEDICAL JARGON

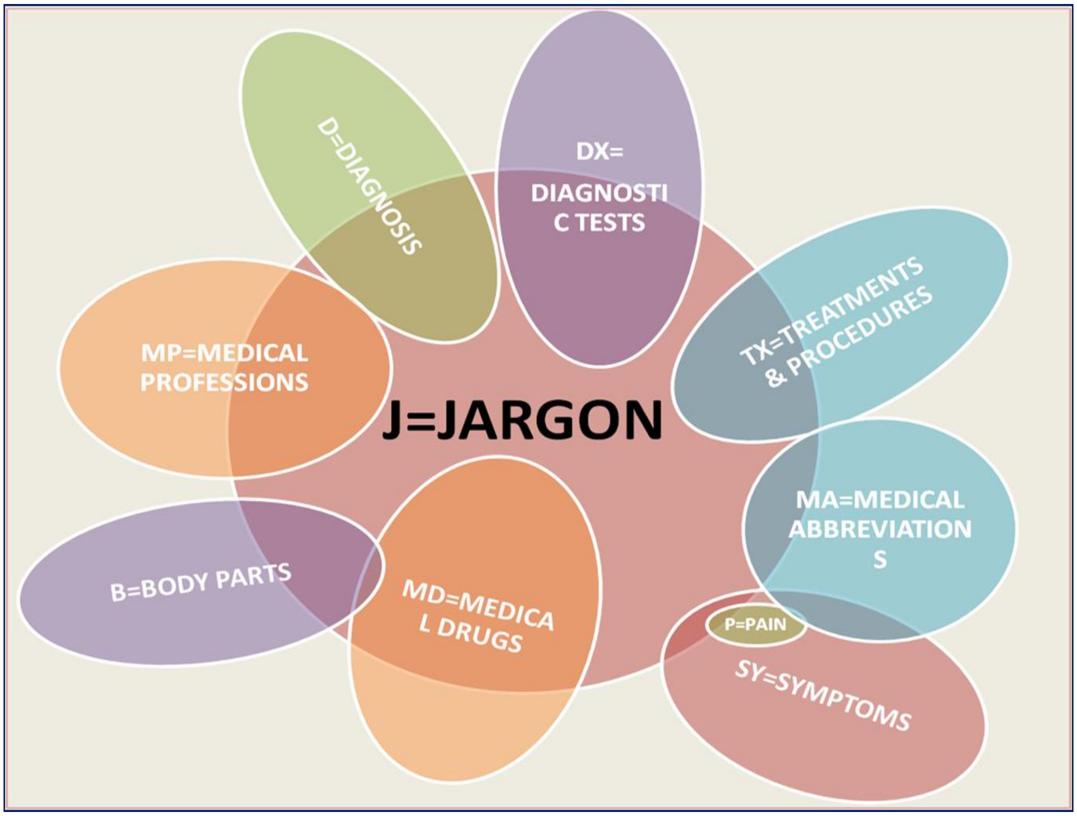

Figure 18. Visual display of medical jargon dictionaries for content analysis

E.5 SAMPLE DICTIONARIES

Content Analysis Dictionaries (CAD) from full Data Set of Physician/Patient Electronic Messages

E.5.1 A=article file for CAD (pre-generated category)

A
AN
THE

E.5.2 B=body parts both medical jargon and common terms (sample only)

ABDOMIN
ABDOMINAL
ACHILLES
ACL
ADENOID
ADRENAL
ADRENALS
AIRWAY
AIRWAYS
ALBUGINEA
ANKLE
ANKLE-BRACHIAL
ANKLES
ANNULAR
ANTECUBITAL
ANTRUM
ANUS
AORTA
AORTIC
APICES
APPENDAGE
APPENDIX
ARCH
ARCHES
ARCUATE
AREOLAR
ARM
ARMPIT
ARMPITS
ARMS
ARTERIAL

E.5.3 C=comparative and degree terms including general frequencies, severity, and intensity (sample only)

A-LOT
ABATEMENT
ABNORMAL
ABNORMALLY-SHAPED
ABRUPT
ABRUPTLY
ABSURD
ABUNDANCE
ABUNDANT
ABUNDANTLY
ABUSIVELY
ACCELERATE
ACCELERATED
ACCELERATING
ACCELERATOR
ACCEPTABLE
ACCIDENTALLY
ACCUMULATE
ACCUMULATED
ACCUMULATES
ACCUMULATING
ACCUMULATION
ACCUMULATIVE
ACCURACY
ACCURATE
ACCURATELY
ACHIEVING
ACTUALLY
ACUTE
ACUTELY

E.5.4 CLR-Collaborative Reference Pronouns

OUR
OURS
OURSELVES
THEIR
THEIRS
THEM
THEMSELVES
THEY
US
WE
YOURSELVES

E.5.5 CT=courtesy terms and casual communication modes (sample only)

ACKNOWLEDGED
ACKNOWLEDGINGACQUAINTED
ADMIRE
AHA
AHAH
AHAHA
AHH
AHHH
AHHHH
ALOHA
ANYWHO
APOLOGIES
APOLOGIZE
APOLOGIZED
APOLOGIZING
APOLOGY
APPRECIABLE
APPRECIATE
APPRECIATED
APPRECIATING
APPRECIATION
APPRECIATIVE
APPRECIATIVELY
ARGH
ASSURANCE
ASSURANCES
ASSURE
ASSURED
ASSUREDLY
ASSURES
AWESOME
BFF

E.5.6 D=diagnosis both medical jargon and common terms (sample only)

ABETALIPOPROTEINEMIA
ABNORMAL
ABNORMALITIES
ABNORMALITY
ABNORMALLY
ABSCESS
ABSCESSED
ABUSE
ACANTHOSIS
ACCEPTABLE
ACHALASIA
ACID
ACID-DERIVED

ACIDOSIS
ACIDS
ACNE
ACROMEGALY
ACUTE
ADDICT
ADDICTED
ADDICTION
ADDICTIONS
ADDICTS
ADENOCARCINOMA
ADENOMA
ADENOMAS
ADENOMYOSIS
ADENOPATHY
ADENOSIS
ADHESIONS
ADNEOMAS
ADVANCE
ADVANCED
AFFIRM
AFFIRMING
AFFLICTED
AFFLICTIONS
AFISHEITIS
AGGRESSIVE
AGORAPHOBIC
AIDS

E.5.7 Dx=diagnostic screenings and tests (sample only)

A1C
ACCUCHECK
ACCURASCOPEACTH
ACTINIC
ACTIVATES
ADDES
ADDITIONAL
ALT
ALT-AST
AMYLASE
ANALYSIS
ANALYTIC
ANAPHYLACTIC
ANGINA
ANGIOGRAM
ANGIOGRAMS
ANOSCOPY
ANTI-GAD
ANTI-HAV
ANTI-SMITH
ANTIBODY-TESTS

ANTICCP
ARTHROGRAM
ARTHROGRAPHY
ARTHROSCOPY
AUDIOGRAM
AUDIOMETRY
BARIUM
BAROMETER
BAROMETRIC

E.5.8 DY=dichotomous terms that reflect absoluteness or polarity (sample only)

ABNORMAL
ABNORMALITY
ABNORMALLY
ABSENCE
ABSENCES
ABSENT
ABSOLUTE
ABSOLUTELY
ADD
ADDED
ADDING
ADDITION
ADDITIONS
ADDS
ADEQUACY
ADEQUATE
ADEQUATELY
AFTER
AGAINST
AGREE
AHEAD
ALIVE
ALWAYS
ANTI
APART
APPEAR
APPEARED
APPEARING
APPEARS
APPROPRIATE
APPROPRIATELY
APPROPRIATENESS
APPROVED
ARBITRARY
ASSOCIATED
ASSOCIATION
ASSOCIATIONS
ASSUME
ASSUMED
ASSUMES

ASSUMING
ASSUMPTION
ASSUMPTIONS
ATTAIN

E.5.9 E=emotion indicated both psychologically and physically (sample only)

ADAMANT
AFFECT
AFFECTIVE
AFFECTS
AFRAID
AGGRAVATE
AGGRAVATED
AGGRAVATING
AGGRAVATION
AGGRESSION
AGGRESSIVE
AGGRESSIVELY
AGITATE
AGITATED
AGITATION
AGONIZING
AGONY
AGREEABLE
AHA
ALIVE
ALONE
ALTER-EGO
AMBITIOUS
ANGER
ANGERED
ANGRY
ANGUISH
ANNOYED
ANNOYING
ANTAGONISTIC
ANXIETIES
ANXIETY
ANXIOUS
APATHETIC
APPRECIATE
APPREHENSIVE
ARDOR
ARDUOUS
ARGUE
ARROGANT
ASHAMED
ATTITUDE
AURA
AWE
AWED

AWKWARD
AWKWARDLY
BAFFLED
BENEVOLENT
BLISS
BLISSFUL
BLUE
BLUES
BOARD
BOGGED
BORE
BORED
BREAKDOWN
BREAKDOWNS
BROODING

E.5.10 F=food and food ingredients (sample only)

ACAI
ALFALFA
ALLBRAN
ALMOND
ALMONDS
ANCHOVY
ANISE
APPLE
APPLE-CINNAMON
APPLES
APPLESAUCE
APRICOTS
ARTICHOKE
AVOCADO
AVOCADOS
BACON
BAGEL
BAGELS
BAKE
BANANA
BANANAS
BARLEY
BASIL
BBQ
BEAN
BEANS
BEEF
BEETS
BERRIES
BERRY

E.5.11 FA=failure or negative valence words (sample only)

ABERRATION
ABNORMAL
ABNORMALITIES
ABNORMALITY
ABNORMALLY
ABSTAIN
ABSTAINED
ABSTAINING
ABSTINENCE
ACCUSED
ADMONISH
ADVERSE
ADVERSELY
AFFLICT
AFFLICTED
AFFLICTIONS
ANGRY
APOLOGIZE
APPALLING
ARGH
ARGUE
ARGUES
ARGUING
ARGUMENT
ARGUMENTATIVE
ARGUMENTS
ASSHOLE
AVOID
AVOIDANCE
AVOIDED
AVOIDING
AVOIDS

E.5.12 J=medical jargon specific to science and the study of medicine (sample only)

ABDOMEN
ABDOMINAL
ABDOMINOPLASTY
ABETALIPOPROTEINEMIA
ABILIFY
ABLATION
ABSCESS
ABSCESSED
ABSEOSINOPHILS
ABSORPTIOMETRY
ABULATROL
ACAMPROSATE
ACANTHOSIS

ACARBOSE
ACCLIMATE
ACCLIMATED
ACCLIMATES
ACCLIMATGING
ACCOLATE
ACCU-PRESSURE
ACCUPRIL
ACCURASCOPE
ACCUTANE
ACE-INHIBITOR
ACE-INHIBITORS
ACEDA
ACEMINOPHEN
ACETABULAR
ACETABULUM
ACETAMINOPHEN
ACETATE
ACETAZALIMIDE
ACETAZOLAMIDE

E.5.13 K=suggestion of kinship and family-like relationships (sample only)

ADOLESCENT
AUNT
AUNTS
BABIES
BABY
BABY'S
BASTARDS
BIRTH-DAD'S
BOY
BOYFRIEND
BOYFRIEND'S
BOYS
BROTHER
BROTHER'S
BROTHER-IN-LAW
BROTHERS
CAREGIVER'S
CHIDREN'S
CHILD
CHILD'S
CHILDREN
CHILDREN'S
COUSIN
COUSIN'S
COUSINS
DAD
DAD'S
DADDY
DADS

DAUGHTER
DAUGHTER'S
DAUGHTER-IN-LAW
DAUGHTERS
DEPENDENT
ELDER

E.5.14 M=general medical terms including jargon and general terminology

Note that the full file includes all of J, D, DX, MA, MD, MP, TX, P, and most SY

ABBREVIATED
ABDOMINOPLASTY
ABDUCTION
ABSCESS
ABSCESSED
ABSEOSINOPHILS
ABSORB
ABSORBABLE
ABSORBED
ABSORBING
ABSORBS
ABSORPTIOMETRY
ABSORPTION
ABUTMENT
ACCESS
ACCESSED
ACCESSIBLE
ACCESSING
ACCOMMODATE
ACCOMMODATED
ACCOMMODATING
ACCOMMODATION
ACCOMMODATIONS
ACCOMPANIED
ACCOMPANIES
ACCOMPANY
ACCOMPANYING
ACCORDANCE
ACCOUNT
ACCOUNTABILITY
ACCOUNTABLE
ACCREDITATION
ACCREDITED
ACE
ACETABULAR
ACETONE-LIKE
ACID
ACIDIC
ACIDIC-TASTING
ACIDITY
ACKNOWLEDGE

ACKNOWLEDGED
ACKNOWLEDGING
ACKNOWLEDGMENT
ACQUIRED
ACT
ACTH
ACTIVATE
ACTIVATED
ACTIVATES
ACTIVATING
ACTIVATION
ACUITY
ADAPT
ADAPTATION
ADDENDA
ADDENDUM
ADDENDUMS
ADDITIVE
ADDITIVES
ADDRESS
ADDRESSED
ADDRESSES
ADDRESSING
ADDS
ADENERGIC
ADENOCARCINOMA
ADHESIVE

E.5.15 MA=medical abbreviations (sample only)

1QID
2-FOLD
2X'S
2XD
2XDAILY
2XDAY
3-FOLD
4-FOLD
5W1D
90-DAY
90D
90DAY
A-FIB
A-FIBS
AA
AAACA
AAIN
AAM
AAN
AARTI

AASE
AB
ABC
ABCK
ABD
ABI
ABIM
ABIS
ABL
ABN
ABNL
ABO
ABS
ABSE
ABT
ABX
AC
AC1
ACC
ACCT
ACE
ACIP
ACK
ACL
ACLL
ACNNOT
ACOG

E.5.16 MD=medication terms including prescriptions, over-the-counter drugs, and words referring to medications (sample only)

ABIEN
ABILIFY
ABULATROL
ACAMPROSATE
ACARBOSE
ACCOLATE
ACCU
ACCUPRIL
ACCUTANE
ACE-INHIBITOR
ACE-INHIBITORS
ACEDA
ACEMINOPHEN
ACETABULUM
ACETAMINOPHEN
ACETATE
ACETAZALIMIDE
ACETAZOLAMIDE
ACETEMEPHINE
ACETIC

ACETONIDE
ACETYLCHOLINESTERASE
ACETYLCHOLINE
ACID-REDUCER
ACID-REDUCERS
ACID-REDUCING
ACIDOPHILUS
ACIPHEX
ACTEMRA
ACTIGALL
ACTONEL
ACTOS
ACYCLOVIR
ADACEL
ADACEL-BOOSTRIX

E.5.17 MP=medical related professions (sample only)

ACUPUNCTURIST
ALLERGIST
ALLERGIST'S
ALLERGISTS
ANALYST
ANESTHESIOLOGIST
ANESTHESIOLOGY
APOTHECARY
ASSISTANT
ASSISTANT'S
ASSISTANTS
ASSOCIATE
ASSOCIATES
ATTENDING
ATTENDINGS
AUDIOLOGIST
AUDIOLOGY
BARIATRICS
BOARD-CERTIFIED
BSN
CARDIOLOGIST
CARDIOLOGIST'S
CARDIOLOGISTS
CASEWORKER
CHIEF
CHIROPRACTOR
CHIROPRACTORS
CLINICIAN
CLINICIAN'S
CLINICIANS
CONSULTANT
CONSULTANTS
COORDINATOR
COORDINATORS

CORRELATION
COUNSELOR
COUNSELOR'S
COUNSELORS
COURIER
DENTIST
DERMATOLOGIST
DERMATOLOGIST'S

E.5.18 MS=medical misspellings: total number 10,988

Due to the size of this file it is not listed herein but must be noted nonetheless

E.5.19 MW=media words including all forms of media, particularly written and electronic (sample only)

ABBREVIATIONS
ABIT
ABSTRACT
ABSTRACTS
ACTV
ADOBE
ANECDOTES
ANNALS
ARCHIVED
ARCHIVES
ARTICLE
ARTICLES
AUTHORED
AUTO-ANSWER
AUTOMATED
AUTOMATIC
AUTOMATICALLY
AUTOMATION
BANDWIDTH
BANNER
BATTERY-OPERATED
BEEP
BEEPER
BEEPERS
BEEPING
BILLED
BILLING
BILLINGS
BINDER
BINDERS

BLIP
BLIPS
BLOG
BLOGS
BLURB
BOOK
BOOK'S
BOOKLET
BOOKS
BOOTING
BROCHURE
BROCHURES
BROWSER
BULLETIN
BUTV
BY-MAIL
CALCULATOR
CARD
CARDS
CASSETTE
CC'D

E.5.20 OA=other abbreviations used more or less by the general public

2TALK2U
AAA
AARP
ADD'L
ADDL
AKA
AMER
AMHA
AMNT
AMT
AMTS
AOL
ASAP
ASSN
ASSOC
ASST
ATTN
ATTY
B-DAY
BDAY
BFF
BLDG
BLVDS
BM
BM'S
BS
BTW
BVLD

C'ED
CC'D
CC'ED
CC'ING
CD
CIGS
CK'D
COMP
COMPS
COMS
CONT
CONVER
CORP
CUZ
DEPT
DR'S
DRAT
DRS
EA
ECT
ENEN
ENUF
ENV
EQUIP
EQUIV
ER
ESP
ETC
ETCS
EXEC
FYI
FYOU
GOV
GYMN
HEAD-CT
IM
INC
INFO
INFOR
IRS
LEGIT
LOL
MEX
MIS
MISCOMM
MLK
MPH
MWPS
NATL
NYT
NYTIMES
NYU
OF
OJ
OKAY
OLR

OMG
ORG
PA
PAR
PBS
PCKD
PCKG
PHD
PICS
PNC
PROF
PS
PTO
QTY
QTYS
QUAD
QUADS
QUAL
REC'ED
REV
RIP
RSVPING
SEC
SECTY
SPAN
TBA
TBS
TBSP
TEMP
TEMPS
THX
THXS
TLC
TNX
TRI
TRUN
TSP
TWP
TYTY
U
UPENN
UPITT
UPMC-HP
UPMC4U
UPMCHS
UPMCPS
URL
USAF
USFA
USPS
UZYAK
V-MAIL
VA
VIET
VOL
VP

WED
WUDL
WWW
XI
XL
XMAS
XOXO
Y-OLD

E.5.21 OC=non-medical occupations and roles (sample only)

ABDUCTOR
ACADEMIC
ACCOUNTANT
ACCOUNTANTS
ACTIVIST
ACTOR
ACTORS
ADDRESSOR
ADMINISTRATION
ADMINISTRATOR
ADMINISTRATORS
ADULT
ADULTS
ADVISOR
ADVOCATE
AGENCIES
AGENT
AGENTS
AIDES
AIDS
AIRLINE
ALARMIST
ALCOHOLICS
ALUMNI
APPRAISER
ARMY
ARSONIST
ASSISTANT
ASSOCIATES
ATHLETE
ATHLETE'S
ATHLETES
ATTENDANT
ATTENDANTS
ATTORNEY
ATTORNEY'S
ATTORNEYS
ATTY
AUDIENCE
AUTHOR
AUTHORITY

AUTHORS
BABYSIT
BABYSITTING
BAKER'S
BAKERS
BANKERS
BANKING
BARBER
BEARER
BELIEVER
BOILERMAKERS
BOSS
BOSSES
BREWER
BRIDE
BROKER
BUILDER
BUM
BUREAUCRACY
BUREAUCRATS
BUSINESSMEN
CALLER
CALLERS
CAMPER
CAPTAIN
CARDINAL
CARE-TAKING
CAREER
CAREERS
CAREGIVER
CAREGIVER'S
CAREGIVERS
CAREGIVING
CARETAKER
CARETAKING

E.5.22 ORS=other reference singular pronouns

HE
HER
HERS
HERSELF
HIM
HIMSELF
HIS
OWNSELF
SHE
YOU
YOUR
YOURS
YOURSELF

E.5.23 P=pain-related words (sample only)

ABRUPT
ABRUPTLY
ABSENCE
ABSENT
ACHE
ACHED
ACHES
ACHINESS
ACHING
ACHY
ACUTE
ACUTELY
AGGRAVATE
AGGRAVATED
AGGRAVATING
AGGRAVATION
AGONIZING
AWFUL
AWFULLY
BACK-PAIN
BACK-PAINS
BANG
BANGED
BANGING
BITING
BLAST
BLASTED
BLASTING
BLOATED
BLOW
BLUNT
BLUNTLY
BLUNTNESS
BOLT
BOLTS
BONE-CRUSHING
BREAKING
BRUTAL
BUGGING
BURN
BURNED
BURNING
BURNS
BURNT
CHRONIC

E.5.24 PL=places other than cities and local vicinities that are omitted identifiers (sample only)

ABBEY
ABROAD
ACADEMY
ACME
ADDRESS
ADDRESSES
ADIRONDACK
AFRICA
AIRPLANE
AIRPLANES
AIRPORT
AIRPORTS
AISLE
ALABAMA
ALASKA
ALTITUDE
ALTITUDES
AMAZON
AMERICA
ANTARCTIC
APARTMENT
ARBY'S
ARGENTINA
ARIZONA
ARUBA
ASIA
ASSEMBLY-LINE
ATRIUM
AUSTRALIA
AVE
AVENUE
AVENUES
BACKYARD
BAHAMAS
BAKERY
BALLROOM
BANK
BANKS
BANQUET
BAR
BARCELONA
BARS
BASEMENT
BATHROOM
BATHROOMS
BATHTUB
BAY
BEACH
BEACHES

BED
BEDROOM
BEIJING
BEIRUT
BENCH
BERMUDA
BINGO
BLVD
BOAT
BOATS
BOG
BOLIVIA
BOLLYWOOD

E.5.25 PN=proper names including nationalities, groups, organizations/businesses, and products (sample only)

ABIS
ABIT
ACHIEVA
ACME
ACTIVIA
ACTV
ACURIAN
AETNA
AFRICAN
AFRICAN-AMERICAN
ALLEGHENY
ALLSTATE
AMERICAN
AMERICANS
AMISH
APRIA
ASIAN
ASTI
ATKINS
AUDEX
AUSTRALIAN
BLUE-CROSS
BLUECROSS
BLUESHIELD
BRAZILIAN
BREG
BRITISH
BRUSTERS
BUDDHA
BULGARIAN
BUNCHER

BUSCH
BUTV
CAESAR
CANADIAN
CARELINK
CAREMARK
CAREMARK'S
CARLOW
CARNEGIE
CHAMPUS
CHI-CHI'S
CHILEAN
CHILEANS
CHINESE
CHRIST
CHRISTMAS
CIGNA

E.5.26 Q=quantity words (sample only)

100'S
1000'S
110'S
120'S
120ISH
120S
120S-130S
125'S
130'S
130ISH
140'S
140ISH
150'S
150S
160'S
160S
170'S
170S
1960'S
1970S
1980'S
1980S
1990'S
1990S
1QID
1XDAY
1XMONTH
2'S
2-FOLD
2-IN-1

20'S
200'S
200S
20S
240'S
28'S
28S
2X'S
2XD
2XDAILY
2XDAY
3'S
3-4X
3-FOLD
3-PERSON
3-PHASE
30'S
30-DAY
30-ISH
30-MINUTE
300'S
300S
30S
3S
3X'S
3XDAILY

E.5.27 QW=question words

HOW
HOW'S
WAS
WHAT
WHATEVER
WHEN
WHENEVER
WHERE
WHEREVER
WHICH
WHICHEVER
WHO
WHOEVER
WHOSE
WHY
WILL
WOULD

E.5.28 R=religion and religious references (sample only)

BIBLICAL
BLESS
BLESSED
BLESSEDLY
BUDDHA
CHANUKAH
CHAPEL
CHRIST
CHRISTMAS
CHRISTMASTIME
CHURCH
CROSS
CULT
DEMONS
DEVIL
DIVINE
EASTER
EXORCISE
EXORCISM
FAITH
FAITH'S
FAITHFUL
FAITHFULLY
FELLOWSHIP
FORCES
GANDHI
GOD
GOD'S
GODDESS
GODS
GODSEND
HANUKKAH
HASHANAH
HAUNT
HEALER

E.5.29 SCJ=standardized list of conjunctions

AFTER
ALTHOUGH
AND
AS
BECAUSE
BEFORE
BOTH
BUT
EITHER
EVEN

FOR
HOW
HOWEVER
IF
NEITHER
NOR
NOW
ONCE
ONLY
OR
PROVIDED
RATHER
SINCE
SO
THAN
THAT
THOUGH
TILL
UNLESS
UNTIL
WHEN
WHENEVER
WHERE
WHEREAS
WHETHER
WHILE
YET

E.5.30 SPP=standardized list of prepositions

ABOUT
ABOVE
ACROSS
AFTER
AGAINST
ALONG
ALONGSIDE
AMID
AMIDST
AMONG
AMONGST
ANTI
AROUND
AS
ASIDE
ASTRIDE
AT
ATHWART
ATOP
BAR
BARRING
BEFORE

BEHIND
BELOW
BENEATH
BESIDE
BESIDES
BETWEEN
BEYOND
BUT
BY
CIRCA
CONCERNING
CONSIDERING
COUNTING
CUM
DESPITE
DOWN
DURING
EXCEPT
EXCEPTING
EXCLUDING
FAILING
FOLLOWING
FOR
FROM
GIVEN
GONE
IN
IN-BETWEEN
INCLUDING
INSIDE
INSTEAD
INTO
LESS
LIKE
MID
MINUS
NEAR
NEXT
NOTWITHSTANDING
OF
OFF
ON
ONTO
OPPOSITE
OUT
OUTSIDE
OVER
PACE
PAST
PENDING
PER
PLUS
PRO
RE
REGARDING
RESPECTING

ROUND
SAVE
SAVING
SINCE
THAN
THROUGH
TILL
TO
TOUCHING
TOWARD
TOWARDS
UNDER
UNDERNEATH
UNLIKE
UNTIL
UP
UPON
VERSUS
VIA
WITH
WITHIN
WITHOUT
WORTH

E.5.31 SRS=standardized list of self-reference singular pronouns

I
ME
MINE
MY
MYSELF
OWNSELF
SELF

E.5.32 SU=success or positive valence words (sample only)

ABATE
ABATED
ABATING
ABIDE
ABILITIES
ABILITY
ABLE
ACCEPT
ACCEPTABLE
ACCEPTABLY
ACCEPTANCE
ACCEPTED
ACCEPTING

ACCEPTS
ACCOMPLISH
ACCOMPLISHED
ACCOMPLISHMENT
ACHIEVE
ACHIEVED
ACHIEVEMENT
ACHIEVER
ADMIRE
AGREE
AGREEABLE
AGREED
AGREEING
AGREEMENT
AGREES
ALAS
ALLEVIATE
AMELIORATE
AMELIORATED
AMELIORATES
AMELIORATION
AMUSING
ANEW
APPRECIABLE
APPRECIATE
APPRECIATED
APPRECIATES
APPRECIATING
APPRECIATION
APPRECIATIVE
APPRECIATIVELY
APPROVAL
APPROVALS
APPROVE
APPROVED
APPROVES
APPROVING
ASPIRE
ASSET
ASSURANCE
ASSURANCES
ASSURANT
ASTONISHING
ASTOUNDING
AWARD
AWARDS
AWESOME
BEACON

E.5.33 SY=symptom terms and general descriptors/words suggesting symptoms (sample only)

ABANDONED
ABERRATION
ABNORMALITIES
ABNORMALITY
ABNORMALLYSHAPED
ABORT
ABORTING
ABORTION
ABORTIVE
ABRASION
ABRASIVE
ABSCESS
ABSCESSED
ABUSE
ABUSED
ABUSING
ABUSIVELY
ACCESS
ACCESSED
ACCIDENT
ACCIDENTAL
ACCIDENTALLY
ACCIDENTS
ACCOMPANIED
ACCOMPANIES
ACCOUNT
ACCUSATIONS
ACCUSTOMED
ACHE
ACHED
ACHES
ACHINESS
ACHING
ACHY
ACIDIC
ACIDIC-TASTING
ACIDITY
ACKNOWLEDGE
ACNE
ACOUSTICAL
ACQUIRE
ACQUIRED
ACQUIRING
ACQUISITION
ACQUISITIONS
ACT
ACTED
ACTING
ACTION

ACTIONS
ACTIVATED
ACTIVATING
ACTIVE
ACTIVELY
ACTIVITIES
ACTIVITY
ACTOR
ACTS
ACTUAL
ACTUALITY
ACTUALLY
ACUTE
ACUTELY
ADAMANT
ADAPT
ADAPTATION
ADAPTED
ADAPTIVE
ADDICT
ADDICTED

E.5.34 T=terms relating to time (sample only)

AFTER
AFTERALL
AFTERMATH
AFTERNOON
AFTERNOONS
AFTERWARD
AFTERWARDS
AGAIN
AGO
AHORA
ALL-DAY
ALREADY
ALWAYS
AM
AM'S
ANNIVERSARIES
ANNIVERSARY
ANNUAL
ANNUALLY
ANYTIME
APRIL

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