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Physicians and Technology: A Collective Case Study of Physicians and Use of Health

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Physicians and Technology: A Collective Case Study of Physicians and Use of Health
Information Technology in Medical Practice

A DISSERTATION

SUBMITTED TO THE COLLEGE OF EDUCATION, LEADERSHIP &
COUNSELING OF THE UNIVERSITY OF ST. THOMAS

By

Mary K. Karrow

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

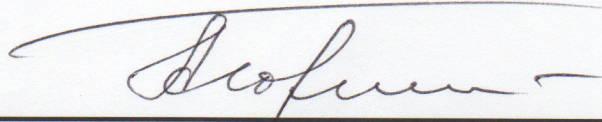
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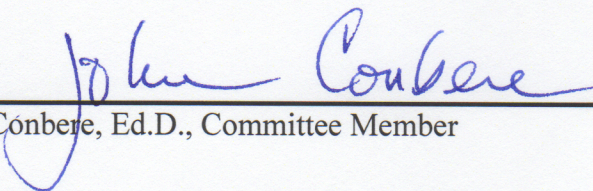
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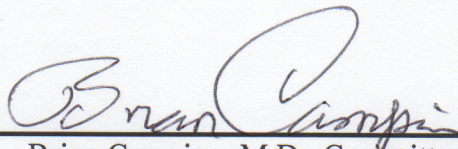
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I would also like to thank the participants in this study who gave their time and shared their experiences with candor and thoughtfulness. I admire their passion, commitment to patients, and continuous thoughts to improving the delivery of care.

Abstract

The purpose of this collective case study was to understand and describe the experience of physicians who use health information technology in medical practice. There are numerous factors applying pressure to the practice of medicine with limited support to physicians practicing medicine. With recent health insurers and both state and federal governments mandating health information technology, physicians are required to implement an electronic health record (EHR) with measurable outcomes and benefits to the delivery of healthcare. This study is significant in that it offers a view into the experience of physicians who use health information technology in medical practice. To gain insight into the experience of physicians and their use of health information technology, I interviewed four physicians practicing in a medical clinic setting. Analysis of the interview transcripts revealed four themes: (a) the change process within the work was the challenge with the EHR implementation; (b) physicians learn best from other physicians; (c) implementation of the EHR impacted the entire team of care providers, not just the physicians; and (d) EHR optimization was reinforced with follow-up training after implementation.

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Chapter One

Healthcare and technology have both been evolving at a rapid pace, impacting many. Physicians have had to adapt to changes in technology in order to provide care to patients. The number of years in practice, comfort with technology, learned efficiencies, and training efforts may all have an influence on how proficient a physician is and the resulting impact on his or her ability to provide care to patients. The ability to communicate electronically is not unique to the practice of medicine. Nearly fifty years ago, journalist Edward Murrow (1964), in an acceptance speech for the “Family of Man” award, described the introduction of the computer to “merely compound, at speed, the oldest problem in the relations between human beings, and in the end the communicator will be confronted with the old problem, of what to say and how to say it.”

Background

The Medicare and Medicaid Electronic Health Record (EHR) Incentive Programs provide a financial incentive for the "meaningful use" of certified EHR technology to achieve health and efficiency goals. By putting into action and meaningfully using an EHR system, physicians might reap benefits beyond financial incentives – such as reduction in errors, availability of records and data, reminders and alerts, clinical decision support, and e-prescribing/refill automation.

The American Recovery and Reinvestment Act of 2009 specifies three components of meaningful use including the use of certified EHR technology: (a) in a meaningful manner, such as e-prescribing; (b) for electronic exchange of health information to improve quality of health care; and (c) to submit clinical quality and other measures.

Meaningful use means providers need to show they are using certified EHR technology in ways that allow them to accurately measure healthcare quality and quantity (CMS – EHR Meaningful Use Overview, 2011). A review of the implementation phases of meaningful use indicates that the financial incentives will become financial penalties in Year 3, if care and cost outcomes are not achieved. This initiative has placed a significant burden on healthcare organizations during a time when the economy and government payment cuts have also had a major impact on the healthcare industry.

In 2001, the Institute of Medicine outlined six aims for improvement for health care in their report, “Crossing the Quality Chasm: a New Health System for the 21st Century” (Berwick, 2001). These six overarching principles help provide specific direction for policymakers, healthcare leaders, physicians, regulators, purchasers, and others to implement change and improve healthcare. According to the Institute of Medicine (Berwick, 2001), healthcare must be:

1. Safe – Avoiding injuries to patients from the care that is intended to help them.
2. Effective – Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse). Doing the right thing for the right person at the right time.
3. Patient-centered – Providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions.
4. Timely – Reducing waits and unfavorable delays for both those who receive

and those who give care.

5. Efficient – Avoiding waste, in particular waste of equipment, supplies, ideas, and energy.
6. Equitable – Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socio-economic status.

Donald M. Berwick (2001), MD, MPP, former President and Chief Executive Officer of the Institute for Healthcare Improvement and one of the authors of *Crossing the Quality Chasm: a New Health System for the 21st Century*, describes “an absence of real progress toward restructuring health care systems to address both quality and cost concerns, or toward applying advances in information technology to improve administrative and clinical processes” (p. 3).

Healthcare provider organizations have focused on practice redesign, including reducing costs, increasing efficiencies, and improving care outcomes. Successful implementation of an electronic medical record is integral to accurate data recording, medical information sharing, and improving care outcomes.

Researcher Interest and Background

As a healthcare administrator for over 20 years, I have seen the struggles and successes of implementing technology within medical practices. With numerous factors pressuring outcomes in healthcare, the physicians become the funnel for all efforts. Time in the exam room with the patient has become filled with other demands, having less and less to do with the care of patients. While there are numerous advantages to having an electronic medical record, physicians seem to have had to adjust their practice of

medicine to accommodate the electronic world. Patients can now contact their physicians by sending an email message, can refill their prescriptions online, and can schedule their own appointments electronically. The addition of the electronic environment increased access to physicians to all hours of the day. One of my physician colleagues described how his day begins as follows, “I finished my night on call where I responded to patient calls during the night. I logged in from home to check my patient schedule for the day and had six messages from patients, 21 orders to sign, over 40 lab results to review and direct follow up care. I had at least two hours of work before my day even started.” To me this kind of statement (and many others like it that I have heard over the years) sounds as though the practice of medicine was becoming increasingly difficult with the added electronic component. My interest was to learn more about the physician experience of increasing the effectiveness of health information technology in medical care.

Statement of the Problem

With the growing pressures on an already overburdened healthcare system, effective and efficient training and implementation of an electronic health record (EHR) is critical for future success. Early EHR implementations have shown this to be costly, both in terms of time and money. Physicians are spending more time at work, with less time dedicated to actual patient care. Burnout of physicians after EHR implementation has also been noted (Lorenzi et al., 2009). In order to be successful, physicians must develop strategies to develop EHR proficiency, while not compromising patient care. The future of healthcare looks to be in a state of flux with healthcare reform on the state and federal level.

Purpose and Research Question

The purpose of this case study was to learn about successes and barriers to the successful implementation and use of health information technology from the perspective of physicians. Through interviews with physicians, who have implemented health information technology in the form of EHRs and continued with proficiency training, I aimed to gain valuable insights and perspectives on how implementation of health information technology impacts physicians. Healthcare is at a critical tipping point, with health information technology a factor that can assist moving an individual and organization forward or significantly holding an individual and organization back. Technology is a necessity and successfully using it as a resource in patient care is critical. Learning from physicians' experience in this case study may be helpful to other physicians, administrators, and healthcare organizations. My research question was: What is the experience of physicians who use health information technology in medical practice?

Definition of Key Terms

CPOE – computerized physician order entry is an electronic system used to order labs, medication, and tests for patients. Results are also sent to the ordering physician electronically.

EHR – electronic health record is a computerized system used to document patient care. The system is also used for scheduling and billing.

Health System – health services organization consisting of hospitals, clinics, and outpatient services.

Health Information Technology is used to describe computerized systems used in patient care. Types of health information technology are CPOE and EHR.

Meaningful Use – federal incentive program for implementation of health information system in medical settings to increase care outcomes and improve cost efficiencies.

Physician-Patient Relationship – the relationship developed between a physician and patient. This is referenced because information technology can hinder the connectedness of the relationship due to distractions and less communication between the physician and patient.

Organization of Study

This dissertation research study is presented in five chapters. Chapter one includes the background of the study, statement of the problem, purpose of the study, research questions, my personal interest, and a definition of key terms. Chapter two is a review of the relevant literature that includes support for medical technology, barriers to implementation, physician training methods, change management, and transforming medical care. Chapter three depicts the case study methodology used for this research. It includes the participant selection, data collection, and analysis procedures. Chapter four is a review of the study's findings including case descriptions and identified common themes. Chapter five presents discussion of the findings, limitations, implications for the organization development field and health care organizations, future research recommendations, and final personal reflections.

Chapter Two

Literature Review

During my preliminary research for this study, I found the literature to be limited in the areas of physicians, technology, and training. I used various online resource databases including Academic Source Premier, Business Source Premier, Expanded Academic ASAP, and Dissertations and Theses. I also searched for related topics within healthcare regulatory and research sites, such as Institute for Health Improvement and Center for Medicare Services. The topics I researched included factors influencing technology in medical practice, physicians and barriers to use of technology, transforming medical care, training methods with physicians, and change management in healthcare. These five categories seemed to have the most influence with the recent push for implementation of health information technology within medical practices, both in hospital and clinic settings.

Support for Medical Technology

Both clinical and economic arguments support the adoption of health information technology. Gawande (2009) provides this summary of the clinical and economic advantages of health information technology:

- Opportunity for patient-physician partnership. Health information technology powers the patient-centered medical home, a framework for coordinating healthcare with a team of practitioners that transcends episodic visits.
- Decision support for clinicians. Physicians face numerous clinical challenges, including more than 68,000 possible diagnoses treated by more than 4,000 procedures and 6,000 different drugs, each of which presents potential adverse

side effects.

- Access to and storage of medical and patient information. Health information technology allows users to retrieve and store vital information, which allows patients to be notified of medication recalls, side effects, and interactions. In the event of a disaster, stored data can be pulled up from a remote location, preventing service interruptions.
- Reduction in filing, transcription, and staffing costs. EHR minimizes the need for paper clinical records and thus the support staff who file, transcribe, and pull them.
- Decreased duplication. EHR has been shown to prevent the duplication of imaging and laboratory tests by up to 20 percent.
- Improved coding accuracy and revenue capture. The EHR provides documentation to easily extract billing information, which improves overall billing and collections processes.

Physicians and Barriers to Implementation and Use

Several themes have emerged in the research regarding the barriers of EHR implementation and use. In one study, the main barriers were high initial financial costs, slow and uncertain payoffs, and high initial physician time costs. Several underlying barriers included difficulties with technology, complementary changes and support, electronic data exchange, financial incentives, and physicians' attitudes (Miller & Sim, 2004).

Of interest to this research was the high initial physician time during EHR adoption. Physicians using EHRs spent more time per patient for a period of months,

even years after implementation, resulting in longer work days, fewer patients seen, or both, for a varied amount of time. With the increase in insurance payment based on care outcomes, physician time in the exam room with patients has many distracting demands, including technology (Miller & Sim, 2004).

Transforming Medical Care

Over the course of several years, the environment of care has changed dramatically with the development of new clinical knowledge, diagnostic and treatment options, and pharmaceuticals. Some would argue that the care delivery systems have remained unchanged, especially in terms of the physician office appointment and scheduling system. The most dramatic change in delivery care has been the development of the EHR. What was a paper world has transformed into an electronic environment, where all orders, results, and documentation is now on a computer. This change necessitates an IT infrastructure that provides rapid access to appropriate patient-specific information, an e-connectivity infrastructure that integrates with EHRs, systems to assure adequate patient follow-up, and methods to track patients. The technology necessary to transform the medical practice is a complete, integrated, interoperable information system (Kilo, 2005).

In the study released by the Pharmaceutical Care Management Association (Kilo, 2005), researchers found electronic prescribing could prevent nearly 2 million medication errors and save the federal government \$26 billion over the next decade—even after providing funds for equipment, training, and support—if physicians were required to use the technology for their Medicare patients. The study found that when physicians use e-

prescribing to learn their patients' medication history and prescription choices, both patient safety and savings improve dramatically.

Training Methods With Physicians

A study by Berman et al. (2009) reported lessons learned from implementing technology which included: (a) physician engagement is the primary determinant of health information technology implementation success; (b) unintended problems and consequences will arise; (c) do not expect any system to work as advertised by the vendor; and (d) consensus building is essential not only to health information technology implementation but also to establishing improved clinical processes and outcomes.

Successful implementation of health information technology has shown physician champions to be key to physician training. Physicians understand the workflows and implications in a manner that only physicians can relate. There may be downsides to this method, as physicians may not see the larger picture of the organization as it relates to their work. The proficiency training model focuses on gains in efficiencies through focused efforts. This includes having the right individuals accomplish the work, meaning that work is efficiently divided between the physician and support staff.

Change Management

Early thoughts on resistance to change in the organizational development literature are credited to Kurt Lewin's pioneering studies on force-field analysis. Lewin (1998) suggested that social systems and biological systems share the characteristic of "homeostasis," or the tendency to maintain a status quo by resisting change and reverting back to the original state. This status quo represents equilibrium between the forces favoring and opposing change. Therefore, successful change rests on organizations'

ability to first “unfreeze” the equilibrium by altering the dynamics of these forces before change can be implemented.

Within a technology context, Keen (2007) defined resistance as “social inertia,” similar to Lewin’s notion of homeostasis. These definitions suggest that, while usage (or non-usage) refers to a specific technology, resistance is a generalized opposition to change engendered by a new technology based on the expected consequences of such change. Resistance is therefore not simply the lack of or the opposite of usage, but a cognitive force preserving the status quo and preventing change. In other words, resistance is an antecedent of organizational change (such as using technology for organizational tasks), and must be first overcome for successful technology implementation (Bhattacharjee & Hikmet, 2007).

Bhattacharjee and Hikmet (2007) also confirmed that physician resistance to change was caused by the perceived threat of their loss of control over their work procedures if they used the CPOE (computerized physician order entry) system. In particular, physicians viewed the CPOE system as a tool that would make them lose control over the way they ordered patient tests, accessed lab results, made clinical decisions, and worked in general.

Summary

While numerous factors may impact the experience of physicians using health information technology, little research has been documented on the topic. Studies noted in the literature review addressed resistance to change, training methods, barriers to use, and changes within the healthcare environment supporting system implementation. There is value in understanding the experience of the physicians in the use of technology.

Chapter Three

Research Methodology and Methods

Research Design and Question

As the purpose of this study was to understand and describe the experience of physicians and the use of technology from the perspective of the participants, an interpretive perspective is fitting. Interpretivism “attempts to understand and explain human and social reality” (Crotty, 1998, p. 66). This study used a collective case study methodology by Stake (2006) with four participants, or individual cases. An interpretive methodology is ideal when the research question starts with a “how” or “what” and when the topic needs to be explored (Creswell, 1998).

A case study is “an exploration of a ‘bounded system’ or case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context” (Creswell, 1998, p. 61). In this study, each participant was considered to be an individual case, or bounded system. Together, the individual cases form what Stake (2006) refers to as the “quintain,” “an object or phenomenon or condition to be studied – a target” (p. 4). I used in-depth data collection with the primary source being participant interviews. My research question was: What is the experience of physicians who use health information technology in medical practice? Within this question I wanted to know:

- How has the practice of medicine changed with the implementation of health information technology?
- What was the experience of the physicians with the health information technology implementation process?

Participant Selection

Participants selected for this study met the following criteria: (a) Are a medical doctor; (b) Have worked within a medical practice, treating patients for at least five years; (c) Have implemented health information technology in a clinical setting; (d) Have participated in technology training.

Purposeful sampling was used to select information-rich cases to illuminate the questions under study (Patton, 1990). I aimed to find four to six participants during the initial recruitment stage. Stake (2006) believed that “the benefits of multi-case study will be limited if fewer than say four cases are chosen, or more than ten” (p. 22). I interviewed four physicians for this study because I found their individual experiences to be unique to them and included findings that will be meaningful to other physicians and organizations.

Participant Recruitment

Because of my interest in studying physicians and their use of health information technology in medical practice, my main source of physician participants are within several healthcare systems. While each participant used a different technology system, the experience within their individual practices was my primary interest. Even though the physicians used different EHR systems, this was not a limitation to the study.

Having worked within several healthcare organizations, I contacted several physicians to assess their interest in participation in the study or to ask if they knew of other physicians who might be interested in participating. I also contacted chief information medical officers who have the responsibility of overseeing technology within several organizations to assess their individual interest in participation or recommendation of other physicians. My first contact with the chief information medical

officers within two organizations was not met with interest due to hectic schedules and what I thought was some fear of discussing what could be seen as potentially proprietary information. One of the chief medical information officers recommended I contact a physician who has an interest in health information technology. I first used email communication to invite participation. For each participant, I did need to send multiple requests to participate. I followed up in person with one participant after not receiving a response. Email communication may have been the easiest means to contact the physicians, but was not the fastest in terms of getting responses. One participant had my original emails placed in her quarantined email box until she could verify the sender of the message. I exchanged phone numbers, with the physicians' agreement, for faster communication during the study, in case additional information was needed. Being a leader within a healthcare organization, I avoided physicians within my direct area of operational responsibilities and did not have physicians participate who work within clinics I oversee.

After a potential participant expressed an interest, I scheduled a brief phone call to review the study, methodology, and interview structure. After describing the study, when the participant agreed to continue with the research participation, I scheduled the first interview session at a time and location most convenient for the physician. For each interview session, I prepared a packet which included two copies of the consent form and an interview question guide. I obtained a signature on the consent form before proceeding with the interview questions.

Data Collection

The goal of the case study methodology was to understand the participants being studied, with minimal disruption to the ordinary activity of the physician. Discrete observation and examination of records are preferred methods (Stake, 2006). Interviews, however, are permitted and participant interviews were the primary tool for gathering data to address the research questions in this study. A table outlining the research questions, the information needed, and how I gathered the information is included in Appendix B.

Interviews

Open-ended participant interviews are an integral part of the data collection. The interviews focused on the experience of physicians implementing health information technology in medical practice. I used the interview process to capture information rich stories and thoughts related to proficiency training, strategies for continued success, and efficiencies gained. The goal was to capture each participant's perspectives and insights.

An interview guide was used for each participant interview to ensure consistency in questions asked. While the interview guide was intended to guide the interview, it also allowed for an open conversation. Probing questions were also included to go further in depth with the questions. (See a copy of the interview guide contained in Appendix C.) The expected amount of time for each interview was 60-90 minutes, depending on how much information was shared. Of the four interviews completed, all were completed within the 60-90 minute timeframe. Each interview was conducted at a location convenient to the participant, but free of distractions and private enough to not interfere with the details shared.

At the beginning of each interview, I reviewed the research consent form and provided an overview of the intentions of the study, their participation, and ability to discontinue at any time. Two participants asked for the interview questions ahead of time and one participant asked to take a copy of the interview questions with him, in case he wanted to add additional details. I indicated to the participants that I would be digitally recording the interviews and having the digital recording transcribed with voice recognition software, reviewed for editing only by me and stored on my personal computer at home. I also told them I would be taking notes during our interview.

Each digital recording of the interviews was transcribed using voice recognition software. This was surprisingly easy to use and required little time for editing of the transcribed documents. After reading through each transcript, I highlighted areas in each case which I thought were the high level summary details of each physician. For each case I completed a Summary Analysis Worksheet accessed from Stake (2006). A copy of this worksheet is located in Appendix D. Use of the worksheet allowed me to organize the content of each case individually and to begin to develop a listing of overlapping themes, summary points, and page numbers for potential quotes to be used in findings of this study. I used summary details from the Analysis Worksheet above in the participant profiles.

Data Analysis

Data collection and data analysis were conducted simultaneously throughout the interview process. I used inductive analysis to look for emerging insights, themes, and patterns. The emergence of themes was an ongoing process. When all of the individual cases were complete, I looked for themes and interpretations of the meaning of the

collective case, or quintain (what Stake (2006) refers to as an object or phenomenon or condition to be studied – a target).

Organization was critical to make sense of the large quantity of data that I expected to collect. Patton (1990) suggested organizing the raw data into a case record. The case record includes all the major information that will be used in doing the final case analysis and case study. Information is edited, redundancies are sorted out, parts are fitted together, and the case record is organized for ready access either chronologically and/or topically (p. 387). By organizing the data into a case record, I was able to analyze the data at a deeper level through development of categories (or themes) followed by placing data into the categories. Stake (2006) provided a number of worksheets to assist with cross-case analysis (see Appendix D).

Validity and Reliability

To strengthen internal validity, I recorded my assumptions at the beginning of the study and as needed throughout the study, so that my biases were less likely to influence the study findings. I reviewed my notes and transcribed documents and formulated tentative interpretations. I emailed my tentative interpretations for each case to the physician participants for a cursory review and asked them if they would make similar conclusions (called member checks). I also used peer examination to comment on my preliminary findings, always keeping in mind the importance of protecting the confidentiality of the participants. For peer examination, I prepared a six-page summary of my research, the interview questions, and a summary of each case that identified potential themes. I reviewed the document with the two healthcare operations leaders and one physician.

Summary

This was a collective case study with four cases. The primary source of data gathering was participant interviews. Each participant was considered to be a case. Themes and interpretations were made within each case and then across cases using cross-case analysis. This research sought to describe the experiences of physicians during the use of health information technology in medical practice.

Chapter Four

Presentation and Analysis of Data

The intent of this case study was to learn about experiences in the implementation and use of health information technology from the perspective of physicians. My interest in the study was learning about their experience to understand how organizations can better support physicians through the transition to an electronic environment. The research question I explored was: What is the experience of physicians who use health information technology in medical practice? I used a collective case study methodology with four individual cases. This chapter describes individual participant profiles and individual portrayals followed by cross-case analysis and identification of themes across cases.

Participant Profiles

The following are the participant profiles for each case. Four physicians participated in this study. For confidentiality purposes, actual participant names were changed in the case descriptions and analysis. I interviewed three male physicians and one female physician. Their years in medical practice ranged from 7 to 24 years, with years of experience with an electronic medical record ranging from 6 to 9 years. One of the physicians has only worked in an electronic medical record and never had to practice with a paper medical record. Each physician expressed a high level of computer skills and higher level of effectiveness with using the electronic medical record. Personal profiles of the study participants are outlined in Table 1.

Table 1

Personal Profiles of Study Participants

Participant Code	Age	Years in Practice	Type of Medical Physician	Computer Skills (0 low – 10 high)	EHR Comfort
Anthony	43	13	family practice	9	9
Carol	38	7	internal medicine	8	8
Dennis	43	14	pediatrics	8	8
Matthew	53	24	family practice	8	9

In terms of education, all participants completed standard medical education paths, undergraduate degree, medical school degree, and residency training in their perspective areas of practice—family, internal medicine, and pediatrics. Two participants had formal physician leadership positions. In addition, two participants were physician “super users” of electronic health records, where they provided system training to other physicians. Discovering that two physicians were super users was an unexpected finding in the initial interview phase and added to my level of questioning, as they were more involved with training other physicians in the use of health information technology. The first participant I interviewed mentioned being a super user and it prompted me to ask, during the subsequent interviews, if the physician was a super user or if his or her organization used super users in training physicians. Table 2 lists the participants’ leadership experience, super user status, and number of years using an EHR.

Table 2

Professional Profiles of Study Participants

Participant Code	Leadership Position	Physician Super User	Number of Years with EHR
Anthony	No	No	6
Carol	No	Yes	9 (no paper)
Dennis	Yes	No	8
Matthew	Yes	Yes	8

Findings

Individual Portrayals. The individual cases are described in this next section.

Any references to an organization, names of EHR systems, or other identifying names have been modified to protect confidentiality of the individual or organization. The mix of participants covered three primary care specialties, different size clinics, varied leadership experience, and a variety of physician super user experience. The group also had one physician who had never worked without an EHR and two physicians who have gone through multiple EHR implementation processes.

Participant 1 – Anthony. We met early one morning before Anthony’s clinic appointments began. We had previously worked for the same organization and it had been at least four years since I had last seen him. I remembered Anthony to be a conscientious and dedicated physician. He went out of his way to serve patients and problem solve through their medical issues. Anthony treated staff well and valued their work as part of the patient care team. When we met for an interview, we briefly exchanged stories about our families and work life. I reviewed the intent of the study,

consent form details, and asked if he had any questions. He indicated he understood the intent of the study and his rights as a participant. He signed the consent form and I began with the demographic questions.

As an overview of responses to the demographic questions, Anthony was a 43-year old male; he had been in medical practice for 13 years as a family practitioner within a family practice clinic with ten physicians. He had been using an EHR for six years. On a scale of 1 to 10, low to high, he rated himself a 9 for overall computer skills and a 9 for effectiveness in using the EHR. Anthony was not in a physician leadership position at the interview time, but had been in the past. He was also not a physician super user.

Our conversation lasted 75 minutes. Our exchange of question and answer was comfortable. Anthony seemed open and candid with his responses, even when the responses were not always supportive of his organization. His first EHR implementation was six years ago and still fresh in his memory. In terms of his responses about the implementation, Anthony felt strongly that the organization could have supported the physicians better. He remarked on recommendations for others implementing EHR:

[I] would like to have had an opportunity to shadow a provider using EHR a month, two months, or six months after implementation to make sure the whole scope of the EHR is being utilized. We find our own ways of using the system, which may not be the most efficient. My partners are doing things differently and we don't stop to talk about better ways of doing things, just no time to make improvements.

Asked how training was handled by the organization, Anthony said he thought there should have been better support. "Training took two weeks and we were left on our

own to sink or swim. There were no circle backs to check our learnings.” On paper the training plan looked standard, with implementation in stages rather than a “big-bang” approach. The training provided was specific to the physician role with on-site peer super user and EHR vendor support. With the first implementation, the whole electronic record had to be built from a paper chart. The electronic version of the patient’s story had to be created.

Anthony was also concerned about the upcoming implementation of a new EHR. He stated the resources needed to help support the physicians were not available and that the option of post-implementation shadow training would not be available. The first implementation included limited shadow training by system trainers; the upcoming conversion would not include training because of the expense. Anthony also said the organization could not afford to limit patient schedules as was arranged in the first implementation. During the first implementation, patient appointment schedules were blocked by 25-50% of full capacity for the first two weeks post-implementation to allow extra time to adjust to the new system without compromising patient care. By not blocking time, Anthony thought:

The new system would not be properly implemented again. Providers need time to understand the system changes, staff workflows, all at the same time making the new system seamless to patients. In the end, patients don’t care if we have a new system and the work is harder, they expect exceptional care.

Discussing the impact on patient care, Anthony said he felt care provided in an electronic environment is far better than in the paper world. He commented on the improved health maintenance, chronic condition documentation, and reminder systems.

Care had changed from a single episode of care to treating the whole patient with all conditions and a focus on wellness. In the past he said it was too challenging to locate and to track all of the patient's medical information. With the EHR, the practice of medicine had changed with physicians provided access to patient records, anywhere, anytime, including hospital and specialty care information. It could take days to get this patient information in the paper world.

As for patient reactions to care in the electronic environment, Anthony commented:

Universally patients have responded favorably. Patients appreciate being able to access their information electronically, as well as know their provider can see care that has been received in other parts of the care system—urgent care, hospital emergency rooms. Patients feel they are receiving better care because of the physician's access to their medical information.

Anthony described how he had to create strategies to involve patients in visits differently. Before the EHR, the visits were 100% verbal communication with simple note taking; with the EHR the visit had changed to creating the electronic patient story during the visit. To avoid not having any eye contact, Anthony turned the computer screen to patients, so they could see what he was doing. He commented on showing a lab value trends or improvements in blood pressure readings. Again he noted that being able to demonstrate this information to patients in the paper world was impossible. This was another recommendation he said would have been helpful; noting the value of offering instruction on how providers could and should interact with patients in the electronic environment, rather than providers creating these strategies on their own. He was certain

that not all of his partners were as skilled at interacting with patients with the computer and this may be a hindrance to creating the personal connection with patients. This personal connection with patients was one of the most important aspects of medical practice as a physician, according to Anthony.

Teamwork in a medical practice was also critical to Anthony. The electronic environment changed how he interacted with his partners and staff. The environment had changed to heads-down computer work and less interaction. He sadly stated, “the EHR basically took away the collegial fun in his work.” The efficiency of the EHR made it possible to not interact as frequently with team members. Because of the change in work, he went out of his way to continue to connect with staff and physicians. He continued to value the importance of teamwork and positive work relationships so that the best care for patients was provided.

The efficiencies of the EHR also put more responsibility on the physicians and made it possible to do more work with less staff. Anthony noted three staff areas in the clinic that required significantly less staff work—phone nursing, business office, and medical records. The EHR essentially replaced these job functions but put more burden on the physicians. Anthony did not see this as a good outcome. He was finding it hard to complete his work in the same amount of time as he had in the past. At the end of his patient appointment schedule, he stated he still had at least two hours of work to do with patient phone calls, results, prescription refills, and visit documentation. He stated that he was paid on production from each patient visit (fee-for-service) and the end-of-the-day work was non-productive to his income but necessary for patient care. In the pre-EHR clinic, there was more staff to assist with the end-of-the-day work.

The advantages of the EHR are outweighed by less staff to do the work and more burden on the physician. There has to be a breaking point before the whole patient care system completely collapses. The future does not look bright for physicians, the massive amount of change in healthcare, and continued demand for healthcare services.

At this point in our interview, Anthony seemed down. He was discouraged about the changes in medicine and not sure if it was more about his organization and how things were being handled here or about medicine in general. He stated he was happy to be a physician and continued to be challenged in his work because he knew he was making a difference in the lives of patients. He stated if he ever felt he no longer was helping patients improve their health it would be time to find a new career, as challenging as that would be. He mentioned two former physicians he knew that left medicine completely. One became a forest ranger and the other a chef, so he felt confident he would have a life after being a physician.

Being able to balance his career as a physician and his home life had been difficult. With two active teenage children, who would be soon finishing high school and starting the next phases of their lives, the demands of his job have been challenging. He had valued being able to have one day off each week in exchange for working longer days on the other four days of the work week. In addition to seeing clinic patients, he also was on-call for after-hour questions and did hospital rounds only on newborn patients. The hospitalized adult patients were covered by a hospital service. The hospital and on-call responsibilities had improved dramatically.

Anthony also shared results of a recent Physician Engagement Survey, which included questions directly related to EHR use, proficiency training, and the ability to finish all work within the standard work day. There were many related findings to this study in the areas of physician burn out, workload, teamwork, and overall job satisfaction. The EHR, while designed to improve the documentation of patient care, training, system inefficiencies, and overall workload, was identified as a major job dissatisfaction element for physicians. One specific question was “I am able to get all my priority patient care needs taken care of during my scheduled work hours.” According to Anthony, the results in his organization were significantly lower than the national healthcare averages. Anthony used this to support his comments about not being able to balance his work and home life and his descriptions of the end-of-clinic-day work. This area of physician engagement deserves future study and discussion.

The main personal worry he described was the EHR conversion in the coming year. He stated the overwhelming amount of preparation necessary for a new system implementation and his fresh memories of the last EHR implementation. He formulated his recommendations to ensure a smoother implementation than the one from six years prior and to maintain his sanity in continuing to practice medicine. His recommendations were as follows: (a) Circle back during the 2-6 months post-implementation to assess EHR competency for staff and providers; (b) Reduce dictation and complete the visit documentation during the visit; (c) Reduce back end work—phone calls, refills, and results that build up throughout the day leaving the end of day disasters and no ability to balance rest of life demands with family and home; (d) Support the workflow efficiencies and standardization; the best systems can be put in place, but fail if not understood and

used by all team members; (e) Avoid staff reductions, which make the clinic too lean and leaves less room for unexpected events that come up.

After describing his recommendations, Anthony seemed to be relieved and had a more positive outlook. He exclaimed that he had not thought about these topics for some time and our discussion brought up feelings about his work as a physician. He again said he took great pride in his work and thought of it as a privilege to take care of patients. Our interview came to an end. I thanked him for his time and input. He asked for a copy of the questions in case he had other information to add. He did not contact me after the initial interview to give additional details.

This was a pleasant interaction with helpful insights into my study. I found the following four points of particular interest:

- increased access to information with electronic environment;
- system limitation impact workflows for team efficiency;
- need for post-training shadowing and training after implementation; and
- loss of human interactions with staff and partners.

Participant 2 – Carol. Our meeting together was a phone call, while she was on maternity leave. We worked for the same organization, but not directly with each other. I knew Carol to be a physician passionate about technology and efficiency. I approached her and assessed her interest in being a part of my research and she gladly accepted. While a phone call was not the most ideal set up for our interview, it worked out well. I was in a private office and Carol was at her home. I reviewed the study details and consent form with Carol. She did not have any follow up questions. Before we began the interview, I recorded a brief part of our conversation to test the recording quality and it

sounded as good as the in-person recordings so we proceeded with the interview. Her newborn baby was sleeping and she preferred to be interviewed while she was on leave because she knew she would be very busy once she returned to work.

Carol is a 38-year-old internal medicine physician. She had practiced for seven years in a smaller primary care clinic with eight other physicians. She started at her current practice after the EHR had already been implemented and had not practiced medicine without an EHR. She was a physician super user for her organization, where she taught proficiency training for other physicians. Carol self-rated her overall computer skills as an 8 and effectiveness using the EHR as an 8. Our conversation together lasted 60 minutes.

Her preferred method of chart documentation was using a templated note, with Dragon voice recognition software with limited hand-typed notes. One of her very first comments, before I asked about the impact of EHR on patients, was that part of the patient story had been lost in the electronic world. Carol described this loss of the patient story as physicians not documenting as much data that was personal to the patient. The electronic chart notes followed a set pattern of documentation with very little variation. She recalled paper charts containing more details about the patient, such as family and past medical history. When I asked her to tell me more about the impact on the patient, she became very animated with her voice and intensity. She referred to the loss of the patient story several times during our conversation. Even though she had never practiced medicine without an EHR system, when she was in medical school and residency training, paper charts were the only forms of documentation. She stated how she looked forward to the day when all documentation was electronic. Carol described the

inefficiencies of hand-written notes and straight dictation into charts as cumbersome. She noted this was a challenge for a few of her older physician colleagues who struggled to convert their documentation into an EHR. Many physicians were not comfortable with technology and took short cuts in their documentation, thereby losing part of the patient story. She described notes of her partners that were straight from a template and each was identical to the next patient. As an example, a physical examination of a patient would only note small differences, where a physician partner would have a difficult time understanding the patient's care needs because of over-generic notes. This inefficiency was what sparked Carol to get involved with proficiency training, where she helped develop and taught EHR modules to physicians.

We let our physicians down by not better supporting their training needs and one system did not work for all physicians. I vowed to never make promises that could not be fulfilled. As an organization we owe it to our physicians to provide the resources and support to be successful.

Next we discussed the impact of EHR on patients. Overall she thought the EHR was a direct benefit to patients. She described the access to information to enhance patient care between different caregivers across all care settings—clinics to hospitals to specialists. In her medical community, her organization's EHR is the predominant system and has the capability to receive information from other care systems with the same EHR. What this means is that a patient could be seen by a competitor and, as the physician, she was able to query the patient visit information and not only read it, but also load it into her EHR system. She saw this as a major benefit to assessing the patient's history and pertinent medical information. Carol also mentioned the challenges of not being able to

receive the information from incompatible EHR systems. In the future, she predicted either there would be one major EHR system and others would convert to it or there would be “massive” (her word) interfaces built to have the smaller EHR systems talk to the major EHR system. Carol believed she had more complete information for patients and saved time by not having to request the medical information from other caregivers.

Another notable benefit to patients that Carol mentioned was the online access to information for patients. Patients were able to see their most recent visit information, lab test results, medication lists, and follow up visit information. She thought the online access to personal health information helped patients keep track of their own health needs and follow up recommendations. Carol noted some resistance by patients to accessing their information online. The way she engaged patients in using the technology was through demonstrating the ease of signing up, reading visit information, and requesting an appointment. She insisted this was the only way for patients to communicate with her. Of course the phone could be used, but in terms of efficiency and engagement in their own care, she strongly encouraged using the electronic tools. After the initial hesitation, she found patients would not give up the online access to their health information and access to the clinic. Carol compared this to other industries. She commented on not remembering the last time she went inside a bank, as all of her banking is online. She thought healthcare as an industry would also convert to all electronic communications between visits to the doctor. “Times have changed and so do the ways we must interact with our patients.”

Our conversation continued with the actual implementation process. An on-site IT training team by far was the most beneficial to Carol, as opposed to watching a training

video, EHR demonstration, or reading an instruction manual. Carol described the IT training team was most effective with a “float” physician who worked on-site who saw patients and used the EHR. The float physician was proficient with the EHR and was able to see patients, while the other clinic physicians were learning the EHR system. Having the float physician working at the clinic relieved some of the patient demand for appointments. Carol’s organization allowed for a physician schedule with a 50% capacity schedule to allow extra time for entering patient information, along with an experienced physician on-site for training. She thought the additional time along with an experienced physician was the best learning method.

If physicians spent more time on the build phase before go-live and 50% blocked schedules were enforced even if the physician did not want it, there was more time to do data entry with each patient. Those who did not do well did not put the time into learning the system when they could have done the work with the patient present. Carol compared the learning environment to parallel play versus interactive play for children. She stated that:

People do better with observation and intervention and parallel play rather than someone just watching you do stuff and giving you advice as you work. If you shadow someone and then give feedback they are more successful such as with parallel play and interactive play as with children.

I was not familiar with the play terminology, so I researched the meanings of her reference to parallel and interactive play. Clinical therapist, Michelle Siegman (2011, para. 3/4) described the play types as the following:

If you see your son sitting next to another child while playing with building blocks but the two of them are constructing separate buildings and barely talking with each other, they are engaging in parallel play. Likewise, if your daughter sits in front of the television playing video games with her friend, in most cases she is also playing parallel to her friend rather than interacting with her.

As for the training of new physicians, Carol thought that her organization did not do it well. She again reinforced that the initial physician EHR training should be followed by shadowing experienced physicians who are familiar with all the different screens and buttons. She summarized her thoughts as “doctors learn best from doctors” and noted that there were several physicians still struggling with efficiency with the EHR.

It had been eight years since the original training was developed. There had not been a review of the training program since the beginning. To develop a proficiency training model, she reviewed training materials, attended physician user groups, and developed a best practices curriculum, which turned into an enhanced demonstration with step-by-step details for the physicians to learn new skills. The proficiency training was five hours, which included two hours of demonstrations, followed by three hours of individual system-build time with templates, preference lists, and system short cuts. The individual physician feedback to the proficiency training was very favorable. Carol described one physician’s feedback, “I feel like I have finally been listened to and I have been out there alone trying to improve my own skills with no resources. The system was interfering with the way I am taking care of my patients.” Carol described the success of the proficiency training:

When it comes to medicine, it is a calling. My calling is medicine and helping patients and physicians with caring for patients. The proficiency training was really fun. It achieved what we needed to achieve with improved system use. The proficiency information has gone viral and been implemented successfully. We had ignored the problem long enough that something big and flashy had to be developed and now the hope is that we can transition to a more cost effective method with circle-back training in place.

Carol continued to describe future system training improvements needed. She thought training for all members of the care team was also needed.

We needed to train more than the physicians. Nine out of ten physicians wanted video training at the clinic site and not full days blocked out of their day—and use the video and team approach for interactive training to make the learning stick. To continue with additional training, metrics on the success of the training were difficult to determine. The only measure of success was feedback from users after implementing new skills.

Our conversation continued with how teamwork changed with the EHR implementation. Carol believed that those who had good communication skills did well with the EHR system. Physicians and staff could avoid interacting with each other if they chose. She thought the EHR did not create new communication issues. Instead of face-to-face conflict, she saw rudeness come through in notes to others and felt the EHR may have accentuated issues that already existed. Carol commented on this as a sign of our times with the increased use of technology in and out of the workplace.

Our conversation was concluded with a few last comments by Carol.

The tragedy of the EHR was the loss of some of the patient story. We need to recapture the humanness of patient care. Perhaps when patient photos are added to the chart for identity theft, this will add a personal touch. Healthcare organizations need to get physicians involved fast with the support of other experienced physicians. And whatever you promise physicians, you must follow through with resources and support. If you do not deliver on your promises, you may not ever recover the heart and minds of the physician group.

Carol's emphatic compassion for patient care and efficiencies for physicians showed throughout our conversation together. At times she was supportive of her organization and at other moments I heard the disappointment she had with support physicians did not receive. The physicians were required to make the necessary practice changes using the EHR, which at times she described as detrimental to patients in personal interactions and the loss of the humanness of patient care. Carol offered several suggestions for improvement: (a) involve experienced physicians early; (b) circle back with proficiency training after EHR implementation; and (c) provide care team training to enhance overall system efficiency. While Carol may have come across in our conversation as negative at times, she seemed to have thoughtful insight into improvements and clearly saw this as part of her calling as a physician to help patients and fellow physicians.

I found my conversation with Carol to be interesting and pertinent to my study. Three of the areas most noted by Carol centered on EHR training: (a) training should include shadowing and should be adjusted based on feedback provided by system users; (b) invest in the overall system and training; and (c) encourage the use of training with

the patient care team. Carol also noted the importance of promoting the increased quality of patient information as an outcome of the new electronic environment.

Participant 3 – Dennis. The third participant is a 43-year old male pediatrician, who has practiced 14 years in a large multi-specialty clinic with fifteen other physicians. He had used the EHR for seven years and rated his overall computer skills as an 8 and effectiveness with the EHR as an 8. He was in a physician leadership position as a medical director for his clinic, but not a physician super user. His organization was also going through an EHR system conversion in the coming year. This was a good topic for us to discuss as he was able to compare the two preparations of his organization. Our discussion took place in a private room of a coffee shop and lasted for 90 minutes.

I began with reviewing the study overview and consent details. Dennis did not have any questions regarding the study intent and his participation. We had several colleagues in common that we had worked with in the past. After a comfortable exchange of details of the colleagues we knew in common, we moved into the demographic questions. Dennis was very detailed in his responses. He took his time and chose his words carefully. With each new question, I felt he truly was interested in sharing his information and took pride in his experiences. He was a self-described “maverick” within his organization, someone who was on the cutting edge of technology and work processes.

The first part of the discussion focused on how he used the EHR system. He described his EHR system as having many limitations. It was physician and staff work intensive, as each individual had to enter information into the system. He also described how his organization had set certain goals, which were measured by the EHR system.

One of the goals was patient “rooming time,” which measured when a patient checked in, was placed into an exam room, and was discharged from the exam room. These were steps in a patient visit that he thought were important, but the measurements forced him and his clinical assistant to enter the information as it was not automatically tracked by the EHR system. He thought entering this information added steps for him but no value. At times, at the end of the clinic day, he would go into his schedule and add the estimated time values for the rooming of patients measurement, so that he was not marked delinquent. He thought strongly that if the measurement was required, the EHR system should track it automatically.

For documentation, he used the EHR templates and hand typing. Dennis also used dictation for longer visits and testing results, as with child psychological testing results. He was working on a scribe pilot, where the patient visit information was entered by a clinical assistant, allowing him as the physician to do less non-physician work. He said it was very early in the pilot stage but showed promises of efficiencies, something he was continually seeking.

The next set of questions concerned the EHR impact on his medical practice. Dennis stated that “the EHR forced a unified approach to patient care documentation and helped support efficiency within his practice.” He developed systems to finish 80 percent of his visit documentation before the patient left the clinic. He was committed to providing each patient with a complete visit summary, plan, and follow up details. He was convinced that his documentation method saved frequent patient calls with questions between visits. The EHR system also provided an improved method for tracking results, phone calls, and patient follow up information.

Health maintenance for patients has improved, as I can see at a glance what the patient is due for chronic and wellness care. There is a chart snapshot that details important patient care information, necessary to provide ongoing care for my patients.

As for patient impact of the EHR implementation, Dennis stated that limited eye contact was the main negative patient impact. He described his strategies for not having less eye contact with patients, but still maintaining the EHR efficiencies and his commitment to complete notes before the patient left. He still took notes on paper when the visit required more detailed information from the patient and entered the information into the EHR. Dennis saw this as a vast improvement over the hand written notes previously placed into the paper chart that he described as impossible for anyone to read and understand. For this reason he described the EHR as providing improved safety for patients due to fewer misinterpreted and illegible patient care notes. His partners, specialists, support staff, and pharmacists needed to understand his plan for each patient and the EHR made that possible.

We next moved into how the organization handled the EHR implementation process. Dennis began by describing the phased-in approach to the implementation. The EHR was implemented and people were trained in its use in one clinic at a time. There were several modules within the EHR system, which were also implemented in a phased-in approach. Dennis stated:

A phased-in approach was successful to allow people to get comfortable with the process, but extended the implementation phase far too long. If given the chance to redo it, I would do it all at once—“rip the Band-Aid off.”

Dennis further described:

The organization had tried hard by flying by the seat of their pants. No one really knew how to do this, but did their best. I wouldn't call it support, but those that did the best had figured it out on their own. The downfall was not having experts and the capacity to overcome the numerous obstacles.

The actual implementation had to be built into the organizational goals—the same as patient satisfaction and clinical goals. Dennis thought that people needed to know that this was important and part of the expectations of the organization. His recommendation was to “fold in people who are succeeding the most and really study it from a process point, then the organization needs to figure out how to teach it in support of all of the goals.” Dennis strongly believed, for the implementation to be successful, all individuals needed to treat it as a priority.

Our conversation naturally flowed into the impact on other team members at his clinic. Dennis thought the EHR affected certain teams and brought people together that previously had not worked together, such as billing and coding staff. He described how the electronic processes took away the visual and auditory systems that were previously working very well. He had used a flag indicator system as a visual indicator for the next patient to be seen or for a patient who had orders to be filled, such as lab work or immunizations. The auditory systems he had used were more voice-to-voice communication with his clinical assistant. The EHR system removed these methods of communication by creating systems within the EHR for communication. New visual cues included instant messaging and system indicators when patients were checked in or roomed and ready for the physician. He still used older systems with EHR, such as visual

flags. Dennis knew his system worked for him and were not necessarily supportive of the EHR work. Dennis stated:

The EHR created solutions to other people's problems, when I did not have the problems. My workflow is the best, but all physicians if asked would say theirs is the best. [The] Organization needs to clearly state that this is how we are going to do this.

Our conversation together was nearing an end. Dennis had a full afternoon of patients, but commented on how he had not thought about the impact of the EHR and had merely accepted it as a way of working. In the coming months, his organization had a planned EHR system conversion. He had very strong feelings about this conversion and commented that this could be a whole new study in the value of EHR and healthcare.

The upcoming new system should not be a problem. We were bullied into changing systems at a huge expense because more of the market had the system. We need to talk with other [healthcare] systems, but this should not mean an expensive new system at the expense of loss of services, people, and facilities. Regulatory requirements were forcing our organization to comply to be able to report information, so we are not fined—does not make sense. Our government should have no part in this work. They have intervened and added more unnecessary expense and wasted time at no one's benefit.

Dennis concluded with a few final thoughts on what he defined as success in EHR implementation. He stated, "A shared culture for success in support of organizational goals with cascading support from the top to the bottom with minimal waste is the best way to implement an EHR system." Dennis wanted to keep this in mind with his next

system implementation. He was hopeful for a successful implementation again and wanted to look for efficiencies in his work without having to create a number of “work-arounds” to support his work processes. He needed to trust that the system would help him take better care of his patients because in the end, if the EHR did not help him, then it had no value to him.

When reviewing the transcript of our meeting, I found it more challenging to get to the meaning of his responses because of the longer answers. He repeated himself frequently, but was consistent with his answers. As I looked for quotes within his responses, again I found them to be wordy and detailed. Although the information was valuable, it was more difficult to summarize for the case description portion of this study. Dennis seemed to analyze each question and his response. He also asked throughout the conversation if I was getting the information I needed for my study. I assured him that his information was helpful and I was getting a good understanding of his experience with the EHR. A few of his comments were noted as interesting for future study, specifically the comments regarding government intervention and mandates for organizations and the EHR implementation.

Dennis was thoughtful in his responses. I found four areas of interest from our conversation: (a) change in patient interactions; (b) organizational approach to implementation process reinforced a shared culture for change and excellence; (c) increased burden on physicians doing more work with less staff; and (d) training most effective with physician users supporting physicians “at the elbow.” His input into my study was helpful and also gave insights into future research about government interventions with EHR implementation.

Participant 4 – Matthew. The final participant was a 53-year old male family practice physician at a large multi-specialty clinic with 30 total physicians. He had been in medical practice for 24 years and an EHR user for eight years. He was a medical director for his clinic and five other clinic locations. He was also a physician super user for his EHR system. Matthew rated himself an 8 for overall computer skills and a 9 for EHR effectiveness. Our interview together took place in his private office at a busy multi-specialty clinic and lasted 75 minutes.

I drove to Matthew's clinic on a snowy Monday morning, which took an hour longer than usual because of the weather. Our meeting started later than planned. Matthew was a volunteer with a dog-rescue organization. We started our conversation about his volunteer work and viewed photos of his past and present dogs. He was open and easy going in the conversation. He expressed his interest in participating in the study because of his commitment to education and passion about patient care and EHR. I reviewed the informed consent details, obtained signatures, and moved into the interview questions.

In answering the initial demographic questions, Matthew described himself as an early adopter of technology. Having been in practice for over 24 years, he did not want to give up paper charts because it was all that he had known in patient care. In the beginning of his medical care practice, the documentation requirements were very minimal. A patient was seen and the only note, for example, was "knee stitched." In the present day, this note would be unacceptable in terms of billing for the services, as well as for providing ongoing patient care. There was little attention given to the patient history and wellness care. After converting to the EHR, Matthew said he would not practice without

the EHR. His use of paper charts was an image of the past to which he would not want to return.

Matthew went on to discuss how the practice of medicine had changed with the implementation of the EHR. Now, physicians entered most of the data where they had previously dictated patient visit notes. He described the EHR and the ease of getting information out of the system as outstanding. He was able to coordinate care with patients with additional care information, i.e., last night's emergency room visit was available when the patient was seen for a follow up visit in the office. The further the patient visit from the implementation date, the more valuable the electronic patient record had become.

Matthew also commented on the ease of patients using online EHR resources for results, notes, appointment reminders, and communication with providers with online messaging. He found he had to adapt his practice style to the electronic world.

I cannot have my face buried in the computer all the time; I have to be careful not to ignore the patient. I now take notes on paper and do not enter progress notes while talking to the patient. Patients prefer to have eye contact with their physician during the visit.

We moved into how the implementation was handled by his organization.

Overall, Matthew thought the implementation was managed well. Everyone was learning, including the super users, who were supposed to be training others. The organization now has expert super users that know the system very well. Their patient appointment schedules were backed off to 50% capacity with a guaranteed salary. There was "at the elbow" training support with physician and non-physician trainers. Matthew preferred the

physician trainers, as they understood the work better as well as how to navigate the system. He also commented on how having the extra time available to enter patient information was helpful. Those who did not take the time to update the patient records with items such as family history and past medical history definitely struggled using the EHR.

As for recommendations for future implementations, Matthew strongly encouraged a higher-level proficiency training program delivered two to three months after the initial EHR training. Originally his organization offered the training program at six months, but he thought it was too far removed from the original implementation to be valuable. Too many of the physicians had struggled with not knowing enough system details to be efficient. Matthew noted the greatest improvement in physician proficiency occurred when physicians shared best practice tips with other physicians.

Matthew was also a super user. He stated that even as a trainer he learned something new each time. He found the proficiency training very helpful for the average user and extremely helpful for below average users. During the training sessions, Matthew noted it was common to see physicians exchanging tips and tricks with each other. It was a safe environment to ask questions without judgment. Matthew commented on how physicians are used to knowing everything in their field or at least how to find out information they may not know. Being uncomfortable and not knowing everything about the EHR was challenging to most physicians.

In terms of teamwork, the EHR changed how Matthew worked with staff. The EHR cannot be ignored and each department had to find ways to learn new workflows and how to work with each other. Matthew noted that clinical assistants needed to learn

how to support the physicians in the electronic world and this support process needed to be standardized and not differ from physician to physician. The EHR also improved communication through tracking and follow through on patient information. Matthew stated, “Everyone played their part and needed to learn what those were. There were different processes with the same outcomes in mind of taking care of patients and their health. This had to be core to the EHR work.”

Matthew described a new team model of care with three clinical assistants and two physicians, where communication was crucial because the work was divided between more staff and each needed to know where the other left off on tasks. The EHR made this possible because of the required documentation. With the paper chart, it was more challenging to divide up work without extensive notes, which was not part of the chart documentation. With the EHR, every electronic chart showed when each staff member worked on the patient details, making the work more efficient.

Matthew naturally moved on to the inefficiencies of the EHR. “Non-techies are the hardest to work with. You must be computer savvy to be successful, if not someone has to take up the slack.” He remarked that newly trained physicians were used to working in the electronic environment and were quick to learn new systems. He thought as time went on more physicians will only have worked in the electronic environment and never in a paper chart environment.

As for recommendations, Matthew encouraged daily huddles with staff to coordinate the work for the day. The patient schedule was reviewed with anticipated patient needs for the day. He also stated that follow up proficiency training for physicians and staff was a must for all organizations. Learnings were reinforced and efficiencies

gained in support of patient care. The final recommendations were in support of the EHR for other organizations. He felt the EHR makes patient care safer and better for patients. The system had a better tracking system than any manual systems created.

According to Matthew, with the difficulty of physicians entering information due to time constraints and lack of familiarity with the EHR, there needed to be more staff available that can enter patient information. Well-trained staff made the work easier, but not all staff members were efficient at entering information and this caused re-work for physicians. The EHR technology did not solve individual inefficiencies; it actually highlighted deficiencies.

Those that were poor at maintaining the paper world translated into the EHR world and it was hard to cover it up in the electronic world. There was tracking for every aspect of work. The same people behind on dictation and had a full stack of charts to work on, now had full electronic baskets.

Matthew continued with closing thoughts on concerns for physician engagement and burnout. He described the practice of medicine in a time of considerable change. Organizations were seeking ways to be more efficient, of seeing more patients with less resources; at times the changes have “fallen on the backs of the physicians.” While Matthew remarked that he thought his organization was supporting physicians well, the enormous amount of change was difficult to absorb. The EHR was noted as just one small change in the midst of massive changes in his perspective. While it was hard to practice medicine without an EHR in today’s medical community, he remarked that older physicians thought they could retire before having to become efficient with the EHR and now know that is not possible. He stated that younger physicians had a much easier time

and easily adapted to new systems and he predicted in the future more physicians would embrace the EHR as a way of working.

Doctors like to know everything and this was one of the areas that we had no idea about how to be the best at it. And in the end if you can't beat 'em, join 'em and if I'm going to join 'em, I'm going to be the best I can be at it.

Our conversation was very comfortable. Matthew was open with his responses and genuinely interested in the impact of the EHR on medical practice. At times his responses were shorter and I needed to use more prompting questions to elicit additional information. His insights as a super user were valuable, as his perspective was from a physician and also a physician trainer. I also was interested in his comments about the EHR just being one small change among larger change initiatives. The aspects of change management for physicians and overall engagement are interesting topics for future research.

I found four major findings in this case that are related to this study: (a) encourage full care team learning for best efficiencies; (b) use EHR system to fullest capabilities; (c) develop proficiency training through super users for best physician learning; and (d) physicians have access to more complete patient information with use of EHR.

Matthew commented on the need for a team approach to create effective EHR learning and use. He felt strongly that the EHR success was dependent on "everyone knowing their role and doing it well." His systems approach to learning and working with the EHR guided his super user role as well as how best to support patient care outcomes. Matthew's approach seemed to come from a broader perspective than some of the other physician participants, who tended to view the EHR more from their own individual

perspective. I was also intrigued by Matthew's insight into future research with a focus on change management and engagement, again supporting more of a system approach rather than individual.

Findings of Cross-Case Analysis

This next section will detail my interpretation of findings across and within the cases as it relates to the experience of physicians and the use of health information technology. The analysis of the open-ended interview questions resulted in the identification of four themes from the four physician participants. Any quotes used were not associated with the participant to further protect their individual identity and organization. While each physician had experiences related to his or her individual information system, I focused on learning about their experiences rather than their issues with the information system used. As an operations leader, I knew my tendency would be to understand their barriers and system limitations and formulate solutions for these issues. I had to intentionally listen to their whole experiences and not just their individual barriers.

Theme 1: The change process within the work was the challenge with the EHR implementation. The actual EHR system was not always the issue; it was the change process within the work that required the most effort. How the individuals handled the change was a common discussion point in this study. Each physician described the change process around the implementation of EHR within his or her individual organization. The changes in their workflows, with patients and co-workers, required the most attention.

Matthew remarked about change with his co-workers: “Everyone plays their part and needs to learn what those are. We each have different processes with the same outcomes in mind—taking care of patients and their health.” He reinforced keeping the end goal in mind of caring for patients.

Dennis also commented on the change process, noting “implementation has to be built into the organizational goals—same at patient satisfaction, clinical goals—people need to know that this is important and part of the expectations of the organization.” He tied the successful change to organizational goals as an approach to success.

Carol also discussed change as it related to the practice of medicine. Medicine had changed and many experienced physicians were having a harder time adapting their practices to “new” medicine. Carol saw the change in medicine as better for connecting with patients, and providing access to information and efficiencies in health information documentation.

Anthony, as it related to the change process, stated that he approached change as he would anything else he encountered—with a positive, can-do attitude. There were many times he experienced melt-downs with his colleagues and staff and played the role of counselor helping others through the difficult change processes. He noted that the areas most challenging for him were how interactions with patients changed. He needed to change how he ran his patient visits, while adding the electronic component to his work. Anthony was able to transition through the EHR impact to his practice but noted many times along the way where he questioned the value it added to patient care.

Theme 2: Physicians learn best from other physicians. This theme related to training and how physicians learn best through training delivered by physician trainers,

who are proficient in the use of the EHR system and who understand how they work. The physician trainers also know how to enhance their care of patients through using the EHR. The physicians noted how EHR system trainers may know the details of the EHR system but they do not always understand the physician work flows and how best to support them.

Anthony stated that he learned best through shadowing physician users for a period of time. He commented on learning the technical aspects, but also what he described as the art of working with an EHR and not impacting his relationship with his patients. This was one of Anthony's challenges with the EHR. Anthony remarked on his strategies of moving from "100% eye contact to point-of-care documentation [completed during the visit] with the EHR." He practiced strategies to maximize his documentation during the visit without getting distracted with the technology of the EHR. He stated there are too many features of the EHR and that he only used the basic essentials to care for patients, but he felt this helped him better interact with patients. His documentation was stellar in his assessment, but not overly compulsive. He learned best after the implementation phase from his partners as they shared their short cuts and tips with each other. As a medical director, he made sure this was a monthly agenda topic on their physician meeting, so that the learning from each other continued.

Carol strongly supported the EHR training delivered by capable physician trainers. As an EHR physician trainer, she found the physicians were most successful when they had an overview of an EHR module, such as order entry, observed a demonstration, and tried an order entry on their own with a trainer shadowing and providing immediate feedback. She described this to a similar process used to learn new

medical techniques when a physician was in training, such as in residency. The process was called a “teach back,” where the physician learning the new procedure would demonstrate competency through showing a trainer how to do the procedure. Carolyn used this technique frequently with her physician colleagues when she trained on the EHR. She commented that physicians were used to this method and did not find it threatening or intimidating. Her classes included physician participant evaluations following the trainings and this was noted as one of the physician key learnings – that they valued being able to see the new process and try it with immediate feedback. Of course, according to Carol, as with any new learning the repetition of the new EHR processes was reinforced with feedback and time. She also noted the overload factor of learning too many new processes as a potential set back in the EHR training. Her assessment was that the organizations that taught the EHR through physician trainers provided the most pertinent training in the most efficient manner.

Matthew, who also functioned as a physician EHR trainer, supported that physicians learn best from each other, whether from a physician trainer or competent physician user. Even as a trainer, he learned from his colleagues who had enhanced workflows. He stated that the EHR had multiple ways to accomplish a task and that this was a challenge of the trainers – to match the best way to accomplish a task with the physician user. An example Matthew gave was of an Infectious Disease Specialist who utilized flow sheets within the EHR that a primary care physician would not commonly use and as a trainer he had to customize his training to their individual use. He found some of the tips he used in trainings came from other physician colleagues who had discovered better ways of accomplishing tasks. Matthew called this the “beauty and

course” of the EHR, that no one way met the needs of all physicians. He fully supported the model of physicians learning best from other physicians.

Dennis also supported learning through other physicians, but preferred a general overview, a trial and error approach to working through the EHR, but reinforced by a competent physician user. He thought his skills were strong enough to learn it on his own, but knew many of his colleagues needed more of an EHR expert. In his feedback, Dennis reinforced that the “organization needed to be nimble in their training approach and have a balance between supporting and overwhelming physicians with the EHR.” He saw too many of his colleagues begin to burn out because of the EHR, which ultimately affected patient care.

Theme 3: Implementation of the EHR impacted the whole team of care providers, not just the physicians. The change in workflows and interactions with co-workers were affected and the participants noted letting go of old ways of doing things and being open to learning new workflows.

Carol noted the teams that were most successful valued communication with each other, whether face-to-face or within electronic notes within the EHR. She stated that caring for patients was not a “solo job,” it required the work of a team to meet all the necessary components of care—scheduling, triage, clinical assistants rooming patients, care coordinators, and billing representatives. She had to remind herself that everyone was learning at the same time at some level of frustration with the changes in workflow and that the physician component was not the most important part. She described the learning period as “needing a good dose of tolerance with each other.”

Anthony noted the change in teamwork as it related to personal interactions. He remarked on the change in workflow and communication with his physician partners and co-workers. He described the EHR impact on the closeness of his team, where the EHR took away some of the personal connections he valued at work. Anthony struggled with finding ways to add the fun back into his work when most communication was through electronic means.

Mark saw the EHR as having a positive impact on teamwork, especially because of the way the EHR standardized processes and workflows. He discussed how the EHR made it easier to find where systems break down in patient care; for example, when a physician runs late the EHR system makes it possible to see where the delay in the process occurs—at check-in, during rooming, or simply waiting for the physician while the patient was in the exam room. Each visit was time-stamped with each step in the care process. He said this was used as a training tool for physicians and staff.

Dennis also discussed how teamwork had changed with the EHR implementation. He thought the EHR took away some of the individuality of patient care with standardization of workflow processes. He thought his own pre-EHR processes were more efficient. Dennis also noted his practice was customized and it was hard for staff to work with another physician and then be assigned to him. As with his pre-EHR workflows, he changed to non-standard workflows to best suit his style of practice. Teamwork for Dennis changed with the EHR, but he thought he was still able to make modifications to his workflows, even if the processes were non-standard. He noted that if this (the modifications to the workflows) was known by his organization, he would mostly likely be asked to follow the standard workflows. With his organization again

converting to a new EHR in the coming year, Dennis said he was not looking forward to the disruptive nature of implementing a new EHR and the impact it would again have on teamwork and workflows.

Theme 4: EHR optimization was reinforced with follow up training after implementation. During the initial EHR implementation phase, physicians learned best from each other, rather than through a process of self-learning and discovery. Questioned about their experiences after the EHR implementation, three of the four physicians said that follow up training was beneficial. Learning enhanced efficiencies after implementation was seen as a benefit to better use of the EHR system.

As a physician trainer himself, Matthew noted that a higher-level proficiency training two to three months after initial training was optimal. With a longer period of time, the physician users tended to not fully utilize the EHR system and developed inefficient workflows. At the 90-day mark, Matthew thought the system was still new enough, but not too overwhelming, to learn EHR enhancements. His idea of proficiency training involved physicians sharing best practice techniques with each other as well as having a focused learning time to customize their own lists, favorites, and short cuts. Because they were learning from each other in a safe environment, the physicians were open to learning new functions within the EHR to support more efficient patient care processes.

Carol's thoughts on follow-up EHR training were very similar to Matthew's feedback. She thought the follow-up training happened too late and her physician colleagues were let down. She approached the follow up training as a "mission to give back to physicians" to better support their work. Training materials were reviewed and

best practice curriculum was developed, which resulted in enhanced demonstrations with step-by-step details for physicians to learn new skills. The sessions also included one-on-one time that allowed them to focus on the individual physician's needs.

Anthony also supported post-implementation training. He felt strongly that bad habits were developed and never corrected, which would have made his life easier. Even though he considered himself an advanced user, he found his partners had very different ways of doing the same tasks. Taking the time to shadow a physician trainer would save valuable patient time each visit and preserve personal time that was spent managing the electronic work. He equated EHR training to showing competencies for a new clinical skill, where it takes practice and reinforcement.

Dennis was the one participant who supported more of a general training overview and "figuring it out on his own." He preferred to learn from experts, who knew the EHR system rather than learning from a video. He acknowledged that self-learning worked for him, but he was unique in his practice. His physician colleagues preferred a hands-on training approach with demonstrations, followed by one-on-one shadowing of other advanced physician users post-implementation. Dennis also acknowledged he was in the minority for wanting to master the EHR system on his own and he may not know all the advanced features and efficiencies because of his approach, but it worked for him.

Summary

Reviewing the data from each case as it related to each of the identified themes was helpful to get the full experience of the physicians and their use of the EHR. Each physician remarked on his or her own experiences, yet was quick to point out the impact of the EHR on other physicians, patients, and co-workers. The four identified themes

were as follows: (1) the change process within the work was the challenge with the EHR implementation; (2) physicians learn best from other physicians; (3) implementation of the EHR impacted the whole team of care providers, not just the physicians; and (4) EHR optimization was reinforced with follow up training after implementation.

Chapter Five

Discussion

Summary of the Study

This study was a multiple case study of four cases with each physician participant as a case. I interviewed four physicians about their individual experiences of the impact of health information technology and specifically their work with the EHR system and the practice of medicine. The information shared by each physician touched on many different aspects—change, training, implementation, competencies, patient interactions, teamwork, workflow changes, burnout, life-work balance, efficiencies, future healthcare impact, and communication. Each case helped build to the cross-case analysis of four essential themes: (1) The change process within the work was the challenge with the EHR implementation; (2) Physicians learn best from other physicians who understand the work; (3) EHR implementation affects the whole care team, not just the physicians; and (4) EHR use was optimized with post-implementation training. To compare my findings to other research, I undertook an additional literature review and included it in the following discussion.

Discussion

The EHR movement is not going away. There will be increased pressure on healthcare organizations to not only implement health information technology but also demonstrate value to patient care through significant measurement and reporting of patient care outcomes. On the current Meaningful Use requirements for 2013, there are over 125 measurements that are required for reporting. These measurements range from patient access to diabetic patient care parameters to patient satisfaction. This

measurement requirement has created significant strains on organizations already under pressure. Research by Anderson (2007), Berwick (2001), and Gawande (2009) supports that the EHR holds tremendous value for the healthcare system in that it increases patient safety, improves the quality of care, and provides greater efficiency.

One researcher acknowledged the pressures and need for continual change within healthcare organizations. Recent research included a qualitative study to explore how physicians overcame previous resistance towards the EHR in hopes that this knowledge could help other physicians move toward adoption (Brown, 2012). The findings revealed nine themes and depicted the following ways physicians can overcome resistance toward the EHR:

...having a lot of patience, adequate training, support from other physicians, ease of documenting, and the fact that it will become mandatory and will affect reimbursement. The information discovered in this study provides ways physicians can overcome resistance, implement and utilize the system in order to improve patient safety, quality of care and greater efficiency for all Americans. (p. 114)

As with any change initiative within an organization, sustainability is crucial to success. Another relevant research study explored success factors in sustaining implementation of health information technology. In this qualitative single-case study, the researcher found sustainability success was based on “successfully assimilating new technologies into daily routines, using strategies to combine technology, processes, and people” (Kennedy, 2011.) Researchers in this study also recommended further study of development of best practice guidelines for adopting and sustaining health information

technology. These factors were similar to those identified within my research, as supported in the four themes identified.

One additional physician researcher (Cohn, 2009) asserted, as it related to physician involvement and collaboration as the most important first step in changing behavior:

I know of no other way to change physician behavior than to use a bottom-up approach that engages physicians. Specifically ...a bottom-up approach, finding the “win” with small projects, healthy competition, physician champions, and positive deviance. Physicians strongly prefer inspiration to supervision.

Autonomy is important to most physician cultures; they do not like being told how to care for their patients. (p. 80)

This physician-to-physician approach was best reflected in my research as it related to the EHR training. Physicians preferred to be trained by physicians. Cohn (2009) also asserted that having physician champions supporting change initiatives helped create a safe and trusting environment for physicians at the same time maintaining individual autonomy.

One final researcher (Morton, 2008) used a Technology Acceptable Model and assessed the attitudes with a survey based on the following factors: management support, physician involvement in selection and implementation, physician’s perceptions of the EHR’s impact on physician autonomy, doctor-patient relationship, perceived ease of use, and perceived usefulness. Study participants also expressed concerns about perceptions of the EHR’s potential negative impact on clinical workflow and efficiency. Adequate training was not a significant predictor of attitudes. This research encouraged using

acceptance models prior to implementation for assessing EHR readiness. As is the case for most healthcare organizations, the option to implement is no longer a choice, however, this research could be helpful in addressing resistance within the overall change initiative. This was also the case in my research, with each physician participant describing the enormous amount of change involved in the EHR implementation, impacting workflows, patient care, and interactions with co-workers.

Significance of the Study

A study aimed at discovering the experiences of physicians and the proficiency with the use of health information technology will be beneficial to individual physician users and healthcare organizations involved in the implementation of health information technology. Implementation of a health information technology system is necessary for the continued survival of practicing medicine. While there are numerous advantages, there are several disadvantages that are sometimes overlooked by organizations. Physicians are in the cross-hairs of system implementations. By learning from physicians about their experience, other organizations could benefit, as could current physician users. Relevant studies have researched the pros and cons of EHR systems, implementation barriers, and technology adaptations. Little attention has been paid to the impact on physicians and their practice of medicine.

As this was an interpretive study, I used in-depth questions to get to the essence of their experiences with the EHR. I was able to get to the heart of the issues with the EHR and work through their findings and recommendations for others working with an EHR. The physicians were thoughtful and freely offered their innermost thoughts about the

impact the EHR had on their profession, their care of patients, and the other care team members that included nurses and support staff.

This research is significant in that it revealed the benefits, challenges, and strategies for successfully implementing new technology into medical practices. This study is also significant to organization development practitioners who are engaged in training and development, change management, and organizational culture work. While similar studies may have addressed the challenges with EHR training and implementation, there was not a focus on how best to support physicians through the change process, solid training recommendations for pre- and post-implementation of the EHR, nor insights of the impact health information technology has on how physicians practice medicine and interact with their patients.

My research uncovered these essential elements of physicians and the use of health information technology: (a) Change in any form is challenging for individuals and organizations; (b) The implementation of the EHR forced enormous change on the physicians; (c) Organizations that are able to understand this impact and involve physicians in the training programs pre- and post-implementation EHR may experience better successes with the change process and sustainability; and (d) Physicians learn better from each other, whether it is because of the understanding of their work or the safe environment created when physicians learn from each other.

As discovered, this method of learning from each other was similar to how they learned from each other in medical school and residency training environments. This further adds to my understanding of why more and more healthcare organizations are placing physicians in executive leadership roles, where non-clinical professionals have

held the roles of chief executive officer or presidents of hospitals. The physicians understand each other's work in a way that non-physicians do not. While I am not saying it is not possible to get to some level of understanding as a non-physician, I believe there was greater learning from physician to physician. This physician-to-physician learning was reinforced after EHR implementation as well. The EHR was more sustainable and more efficiently used by physicians that had "circle-back" training post-implementation. By shadowing other physicians, their learning was reinforced in a safe and supportive environment.

Another significance of this study was the impact the EHR had on all care team members, not just the physicians. The impact to the workflows was significant. The way of working and communicating with each other had to be redesigned with the change in communication practices being the most affected change. While the physicians felt the impact, the support staff was now working in an electronic environment where their communications were recorded and not with a hand written note left on the physician's desk to respond to. New means of interacting with each other needed to be developed to maintain healthy working relationships, rather than simply transactional exchanges on the computer. Each physician described how this change was noticeable and how it took effort to look up from the computer work and interact, even if the work did not require it.

The change in interactions with patients was also a key discovery in this study. Each of the physicians had to find ways to interact with their patients, while still documenting the visit information. The nature of the work had changed enough that new strategies had to be developed, so the patients did not feel the computer was more important than the conversation with them as a patient. Physicians who were more

successful engaged their patients in the electronic information by turning the screen and reviewing information, sending results by electronic means, and inviting patient questions be sent to the physician by using the EHR email system, to name a few.

In the end, the physicians supported the EHR and could not see practicing without it. While the learning and implementation phases were challenging, the benefits to patient care, gained efficiencies, and access to pertinent medical information far outweigh the change process challenges. The future of healthcare will be improved with the implementation of the EHR. It was a privilege to share in their experiences and elicit deep personal opinions about their work.

Implications for Practice

There are several implications of this study to note, both for the practice of organization development and for healthcare organizations.

EHR and the practice of organization development. For the practice of organization development, the change management process within the implementation of the EHR needed support. The main challenges the physicians faced were related to navigating through change successfully. The physicians did not have a choice in the EHR system, the training methods used, or the workflows implemented with the EHR. They each had thoughtful insights into improving the implementation process, training programs, and efficiency support for the EHR. Healthcare organizations will continue to face numerous change initiatives and would benefit from how to support the physicians through change. There may not be choices in the changes ahead, but physician involvement in planning the change and the process would be beneficial. As with the EHR training, physicians learned best from each other. Designing change initiatives with

physician leadership and champions would be a good first step for healthcare organizations. This study showed each of these important points—involving physicians in training other physicians and involvement in major change initiatives. Organizations that have placed physicians in leadership roles have taken steps to involve physicians on the level necessary for success in the major changes within healthcare.

EHR and the transformation in healthcare organizations. As an industry, healthcare has seen major transformation over the past decade with technology implementations, treatment advances, and care delivery integration. Over the next decade it is predicted that healthcare will continue to be transformed with implementation of the Affordable Care Act and reimbursement systems shifting from production to performance measures, i.e., payment based on patient satisfaction and clinical care outcomes. With this enormous amount of change ahead, this study demonstrated key features of how healthcare organizations can leverage the strength and knowledge of their physicians to successfully meet these upcoming challenges. These changes may be more impactful than the implementation of an EHR and organization's need to understand how the changes will impact physicians, care of patients, workflows, and the staff who support patient care. Work as it is known today will not be successful without embracing the changes ahead. When I look at the challenges of implementation in current organizations, I think it is critical that lessons learned from past implementation successes and failures need to be studied and understood; we need to build on what was successful and not repeat failures of the past. Within healthcare, engaging the physicians in the change initiatives and the training of other physicians has tremendous value.

Limitations

Merriam (1998) identified several limitations to qualitative case studies. First, collecting data from multiple interviews and observations is ambitious. A large amount of data is collected and that can make analysis challenging. Second, the presence of the researcher as an observer and the process of conducting interviews may alter the perceptions, actions, and experiences of the subjects in the sample. Third, the researcher might knowingly, or unknowingly, bring personal bias to the study which could affect any or all aspects of the study. Lastly, case studies can potentially oversimplify or exaggerate a situation.

In addition, there may be limitations to the study based on interviews of physicians within one geographic area. In the state of Minnesota, over 80 percent of medical practices have an electronic medical record, while the national average is only 30 percent (Soderberg, 2013). The experience of physicians in Minnesota may be very different from those in other states. Minnesota is also known to be one of the most integrated healthcare industries, as seen in the healthcare systems that cover hospitals, clinics, pharmacies, long term care facilities, and other ancillary services. Other healthcare organizations in other states may not have had the need to be as integrated with services and their EHR. The Meaningful Use standards and deadlines are making it necessary for all states to be compliant.

The length of time the health information technology has been in place may also be a limitation. The average length of time for the physician participants in this study was 7.75 years, which is considered experienced within the EHR world, where many healthcare organizations are still implementing systems. These participants were from

well-established healthcare organizations where the EHR was in place for some time. For example, in Anthony's case, his organization was preparing for an EHR system conversion, so even if the EHR had been stable, there was still a need to change the system to meet the growing demands for measurement reporting and sharing of medical information with other caregivers. My point is that an additional limitation may be not only the length of time the EHR was in place, but also the caliber of the EHR and its ability to meet the current electronic healthcare demands.

Suggestions for Future Research

Valuable insights that participants shared often related to the need for future research. Each participant thoughtfully offered areas for future research and study. Most notable of these recommendations for future research was physician burnout/engagement as it related to the future of healthcare. An additional suggested area of future study concerned the involvement of government in regulating and mandating healthcare changes. Both physician burnout and government intervention are areas of great interest and significant debate. I look forward to accessing information from other researchers on these areas of high interest in healthcare.

Researcher's Bias

As a healthcare operations leader for over 20 years, I had a good understanding of the impact of the EHR on healthcare organizations, but did not have the full understanding of the impact on the lives and experiences of physicians. I knew the EHR implementation was challenging for everyone involved, from physicians to staff to patients. The EHR had changed almost every aspect of the healthcare operations world—how appointments were made, how visits were documented, how results were

communicated to patients, and how services were billed, to name a few. Having been involved in the EHR implementation change process, I had to keep my own challenges with the EHR in mind as I approached this study. The questions asked and follow up questions had to be aimed at the participant experiences and not mixed in with my own experiences.

Earlier in the study, I described the cross case analysis and how the focus was on the experiences of each physician and not limitations or advantages of their individual EHR system. Again as an operations leader, I had to focus on their experiences and hold back my tendency to try to intervene and solve their organizational issues. I had to intentionally listen to their whole experiences and not just their individual barriers. Each participant knew my role within a healthcare organization and I had to gain their trust with their information shared. I assured each participant that the information shared would be held in confidence and any analysis would be blinded to not identify them as an individual or as part of an organization. One participant asked if I would name the EHR system in my research and I responded with no, as the system was not the focus, rather their individual experience with the EHR was the focus. This seemed to alleviate any hesitation in the physician. I needed to be certain that my prior knowledge of EHR implementations and use did not sway my questioning and interactions with the physicians. I kept my individual opinions out of the interview space.

Another aspect of researcher bias was the working relationships I have with many physicians. As an administrator, I am faced with numerous physician issues each week for a variety of reasons—under-producing volumes, underperforming on clinical quality goals, demanding additional resources, and mistreatment of staff, to name a few.

However, not all physicians have these issues. While meeting with each physician participant, I also had to keep these “physician issues” in check, so that it did not cloud my interviews with him or her. I had to approach each physician as a new case with no prior knowledge of his or her working behaviors. To be conscious of my own biases, I wrote a list of the items that did not pertain to my interpretations of their experiences. The list above included many of the items I needed to not mix into my interview with the physicians. I found this to be helpful for my interactions with the participants.

Conclusion

I was honored that the physicians in this study were comfortable sharing their candid observations, insights, and innermost thoughts about health information technology and its impact of their practices. Understanding the experiences of physicians and the use of health information technology in medical practice was invaluable to me. I did not anticipate hearing such passion in their voices around the impact the EHR had on their practice of medicine and the change associated with the implementation process. I understood the challenges around change, buy-in, and sustainability, but this study demonstrated what was necessary for change initiatives to succeed and to fail. The involvement of physicians training other physicians was the most helpful insight as I think organizations have under-rated and underfunded training for physicians with change initiatives. This is certainly one item that I will bring into my future healthcare operations work.

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Appendix A

Consent Form

Dear [Name]

I am conducting a study about the experience of physicians and the use of technology in medical practice.

I invite you to participate in this research. You were selected as a possible participant because you are practicing physician who uses technology in your work treating patients in a medical care facility.

Please read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Mary Karrow, a doctoral candidate in Organization Development at the University of St. Thomas.

Background Information:

The purpose of this study is to fully understand and describe the experience of physicians and the use of health information technology in the practice of medicine. The use of technology for physicians has changed how they work, not necessarily the science of medicine. Individuals who are pursuing a career in medicine or those who are already in medical practice may find this research of interest as they consider the impact of technology on their work.

Procedures:

If you agree to be in this study, I will ask you to do the following things:

1. Participate in a 60 to 90 minute interview to be conducted by me at a location that is comfortable for you. This may be at your work-site, at a private office that I have access to, or at an alternative location that you suggest. During the interview you will be asked to talk about your practice of medicine and technology, methods of learning and using new applications of technology, and your advice for successful technology implementation and the impact of technology implementation on the future practice of medicine.
2. Give your permission to use a digital recording of our conversation during the interviews. The digital recording will be transcribed into a written format to be used for analysis purposes.
3. Select a work setting in which I may observe your work and use of technology. Examples might be a patient clinic visit, a hospital visit, or medical record documentation and management of your “in box” work. You may decide on a context and date. This observation will be approximately 30 to 60 minutes in length.
4. As a final step, you will be asked to review the preliminary findings to determine accuracy and to identify aspects of your experience that may have been missed. Any relevant changes will be incorporated into the final report.

Risks and Benefits of Being in the Study:

The process of interviewing could cause discomfort at times. I will work to minimize such occasions. You will decide what experiences you want to share and you can stop the interview at any time.

To minimize the risk that your identity will be recognized I will use a pseudonym. In my dissertation and in any follow up reports that I publish, I will not include information that will make it possible to identify you in any way.

You will have the personal benefit of possible insights that you will gain through reflecting on your experience.

Confidentiality and Anonymity:

Precautions will be taken to maintain confidentiality and to protect the anonymity of the participants. All records of this study will be kept private. To protect your privacy, the transcript of your interview will not include your name. If I choose to use a transcriptionist, I will require him/her to sign a confidentiality agreement asking her to keep any responses transcribed confidential. In my dissertation and in any follow up reports that I publish, I will not include information that will make it possible to identify you. On occasion, specific quotes will be used and attributed to an assigned fictitious name.

Paper research records and digital recordings will be kept in a locked file. Computer records will be password protected. Back up files will be stored on a portable storage device that will be kept in a locked file box. I am the only person who will have access to the records. The digital tapes will be deleted within one month of the dissertation approval. Paper records will be destroyed within five years of the study publication.

Rights of the Participant

Your participation in this study is entirely voluntary. If you decide to participate, you are free to withdraw at any time without penalty. During the course of the study you have the right to end an observation or an interview at any time. Should you decide to withdraw, data collected about you will not be used in the study. Your decision whether or not to participate will not affect your current or future relations with the University of St. Thomas.

I am committed to preserving your dignity as a participant and do not want to make you vulnerable as a result of your participation in this study. You have the right to review the findings from the study to ensure that there is nothing included that would make it possible to identify you. If you believe something is included that could identify you, this information will be deleted.

Contacts and Questions

This study will be conducted by Mary Karrow, a doctoral student at the University of St. Thomas. If you have questions now, or if you have questions at any time

in the future, you may contact me at 651-253-9269. You may also contact my advisor, Alla Heorhiadi at 651-962-4457, or the University of St. Thomas Institutional Review Board at 651-962-5341 with any questions or concerns.

You will be given a copy of this form to keep for your records.

Statement of Consent:

I have read the above information. My questions have been answered to my satisfaction. **I consent to participate in this study, to be digitally audio-recorded during interviews, and to being observed in my work setting.**

Signature of Study Participant

Date

Signature of Researcher

Date

Appendix B

Table for Case Study Methods

Research question	What information do I need?	How will I gather the information?	What the source provides
How has your practice of medicine changed with implementation of health information technology?	Thoughts, feelings, and experiences of participants Observations of the participant by others	Interviews (open-ended) – Participants Interviews with individuals associated with the transition experience of the participant	Provides participant’s perspective and insights Provides alternative perspective and insights
What would you recommend for other organizations implementing an EHR?	Thoughts, feelings, and experiences of participants Observations of the participant by others	Interviews (open-ended) – Participants Interviews with individuals associated with the transition experience of the participant	Provides participant’s perspective and insights Provides alternative perspective and insights
After the EHR implementation, how did your work with work team change?	Thoughts, feelings, and experiences of participants Behavioral observation of application	Interviews (open-ended) – Participants Observation – Participant with work team or professional colleagues	Provides participant’s perspective and insights Provide triangulation of data sources through direct observation
What recommendations do you have for other physicians implementing an EHR?	Thoughts, feelings, and experiences of participants Behavioral observation of application	Interviews (open-ended) – Participants Observation – Participant with work team or professional colleagues or patient	Provides participant’s perspective and insights Support and/or supplement other sources of data

Appendix C

Interview Guide for Participants

Interview Guidelines

At the outset of the interview, review the consent form with the participant. Review the background information including the purpose of the study. Go over the procedures including agreement to use a digital recorder to record the interview. Review risks, benefits, confidentiality, and anonymity. To ensure shared understanding, ask the participant what confidentiality and anonymity means to her/him. Remind the participant that her/his participation is voluntary and remind her/him of rights. Ask the participant if she/he has any procedural questions. Reaffirm consent to participate and obtain written consent from participant prior to beginning the interview.

Demographics Information

1. What is your age?
2. What is your gender?
3. What is your educational background?
4. How many years have you been working in medical practice?
5. What is your current position?
6. What type of medical practice/setting do you work within?
7. How long have you been using an electronic medical record?
8. On a 1 to 10 scale, 10 being highest, how would you rate your overall computer skills?
9. What method do you use for your chart notes, dictation, hand typed, templates with smart sets or a combination? Please specify.
10. On a scale of 1 to 10 with 10 being excellent, how do you rate your effectiveness of using the EHR?

Interview Questions

1. I want to begin with some questions that set the stage for our conversation. How has your practice of medicine changed with implementation of health information technology?

Probes as needed:

How did patients respond to the electronic implementation?

Follow up questions:

What strategies do you use with the EHR while with patients?

2. The next set of questions has to do with the actual implementation of the health information technology. How was the implementation of the EHR handled by your organization?

Probes as needed:

What would you recommend for others implementing an EHR?

Follow up questions:

What strategies did you use to be successful in the implementation process?

3. Now I want you to focus on how the EHR impacted teamwork within your work setting. How did your work with co-workers change?

Probes as needed:

Describe for me how the work culture changed with implementation of the EHR?

Follow up question:

What efficiencies did you gain? What inefficiencies were created?

4. What recommendations do you have for other physicians implementing an EHR?

Probes as needed:

What would you do differently as it relates to your beginning use of the EHR?

Follow up questions:

What recommendations do you have for improving the use of the EHR?

Appendix D

Analysis Worksheets
(Worksheets used in analysis are from Stake's Multiple Case Study Analysis, 2006)

Worksheet #1 – The Themes (Research Questions of the Multi-case Study)

Stake (2006)

Theme 1:
Theme 2:
Theme 3:
Theme 4:

Worksheet #2 – Analyst's Notes While Reading a Case Report

Case ID _____

Stake (2006)

Synopsis of case:	Case Findings: I. II. III. IV.
Uniqueness of case situation for program/phenomenon:	
Relevance of case for cross-case themes: Theme 1 _____ Theme 2 _____ Theme 3 _____ Theme 4 _____	Possible excerpts for cross-case report: Page Page Page
Factors (optional):	
Commentary:	

**Worksheet #3 – Estimates of Ordinariness of the Situation of Each Case and
Estimates of Manifestation of Multi-case Themes in Each Case**
Stake (2006)

M = high manifestation*, m = some manifestation, blank = almost no manifestation

W = highly unusual situation **, u = somewhat unusual situation, blank = ordinary situation

	Case A	Case B	Case C	Case D	Case E
Ordinariness of This Case's situation:					
Original Multi-case Themes					
Theme 1					
Theme 2					
Theme 3					
Theme 4					
Added Multi-case Themes					
Theme 5					
Theme 6					
Theme 7					
Theme 8					
Theme 9					

*High manifestation means that the Theme is prominent in this particular case study.

**A highly unusual situation (far from ordinary) is one that is expected to challenge the generality of themes.

As indicated, the original themes can be augmented by additional themes even as late as the beginning of the cross-case analysis. The paragraphs on each Theme should be attached to the matrix so that the basis for estimates can be readily examined.

