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A Multisite Hospital's Transition to an Interoperable Electronic Health Records System

Valerie Gerene Drill
Walden University

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Walden University

College of Management and Technology

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Valerie Gerene Drill

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Review Committee

Dr. Kenneth Gossett, Committee Chairperson, Doctor of Business Administration Faculty

Dr. Michael Ewald, Committee Member, Doctor of Business Administration Faculty

Dr. Timothy Malone, University Reviewer, Doctor of Business Administration Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2016

Abstract

A Multisite Hospital's Transition to an Interoperable Electronic Health Records System

by

Valerie Gerene Drill

MS, Embry-Riddle Aeronautical University, 2003

BS, Oregon State University, 1998

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

December 2016

Abstract

The health care industry is transforming into an industry that requires health information technology, yet many health care organizations are reluctant to implement new technology. The purpose of this case study was to explore strategies that lead to a successful transition from an older electronic health record (EHR) system to a compliant EHR system at a multisite hospital system (MHS). The study included face-to-face and phone interviews with 12 managers who worked on the transition of an MHS's EHR system in the Pacific Northwest region of the United States. The technology acceptance model was used to frame the study. Audio recordings with these managers were transcribed and analyzed along with interview notes and publicly available documents to identify themes regarding strategies used by managers to successfully upgrade to a compliant EHR system at an MHS. Three major themes emerged: hybrid implementation strategy, training strategy, and social pressure strategy. Results may be used to facilitate the adoption of information technology systems in any industry. Results may directly benefit other MHSs by facilitating successful EHR system transitions. Implications for social change include improved care coordination, reductions in duplicated medical procedures, and more timely and relevant tests for patients through the full use of EHRs.

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Dedication

I dedicate this doctoral study to my husband, Scott Drill who provided me with steadfast support, encouragement, love, and a colleague at each stage of my doctoral journey. I also dedicate this work to my daughters, M'Kenzie and Jordan Drill. They understood and forgave, the lack of sleepovers and a frazzled mom who came to swim meets, but sat in the back of the stands with her laptop. I hope I have taught them that neither age nor location are limiting factors for learning and growing.

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I thank “my hero.” Your support opened the door for site IRB approval. I thank the participants in my study for their contributions. Last, but not least, I am grateful for my Walden University classmates. Knowing that I was not alone in this journey made all the difference.

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Section 1: Foundation of the Study

The U.S. Congress passed the HITECH Act, in 2009 to increase the use of electronic health records systems (EHR) for the purpose of improving the health of the average American (Hsiao, Decker, Hing, & Sisk, 2012; Steinfeld & Keyes, 2011). The HITECH Act was an enormous change in health care legislation (DesRoches et al., 2013). This legislative change is driving hospitals and health care practices throughout the United States to implement EHR systems and update older EHR systems.

Background of the Problem

The inevitability of EHR system adoption is clear to most health care leaders (Song, McAlearney, Robbins, & McCullough, 2011). The HITECH Act changed the relationships among health care providers, organizations, patients, and payers by focusing on the use of health information technology (HIT) (Adler-Milstein, Bates, & Jha, 2011). Hsiao et al. (2012) found 124,000 eligible physicians had applied for incentives in 2011. The law provided more than \$30 billion in incentives and subsidies for health information exchanges and educations and the purchasing of HIT (Adler-Milstein et al., 2011; Jha, 2010). EHR systems cost between \$40 million and \$350 million, which diverts large amounts of capital from direct patient care (Brooks & Grotz, 2010; Song et al., 2011).

Implementation of EHR systems created initial slowdowns and inefficiencies in workflows (Pizzi, Suh, Barone, & Nash, 2005). Brooks and Grotz (2010) noted a 50% reduction in productivity for the first two to three weeks after the go-live date keeps morale up. Hospital administrators have limited strategies for transitioning to a new EHR system.

Problem Statement

Song et al. (2011) reported EHR system implementation costs range from \$40 million to \$350 million. Fleming et al. (2014) found the implementation potentially results in the savings of \$14,055 per provider, the reduction of one administrative staff, and approximately \$10,000 in continuing annual savings. The general business problem was that legislation is mandating hospital administrators to make changes in the technology used to store and to transmit medical records. The specific business problem was that hospital administrators have limited strategies for transitioning from an older EHR system to a compliant EHR system in a multisite hospital system (MHS).

Purpose Statement

The purpose of this qualitative exploratory single case study was to explore strategies that lead to a successful transition from an older EHR system to a compliant EHR system at an MHS. The study included interviews with senior managers who had implemented an EHR system transition within their MHS. The population members live in the Pacific Northwest and had insights into the factors for a successful transition from experience in a health care setting while implementing an EHR system upgrade to meet the federal requirements. The qualitative case study addressed the strategies involved in the successful transition from an older EHR system to the compliant EHR system through the review of documents, observations, and semistructured interviews. Determining a more effective process for the transition from older EHR systems to compliant EHR systems may result from the findings of the study. Findings may contribute to social change by identifying strategies related to a successful transition while improving

medical record portability for hospital and health care provider staff who are going through the same process in the coming years.

Nature of the Study

Determining the appropriate method involved the combination of the nature of data available, the research problem, and consideration of the body of knowledge (Watkins, 2012). Studies in which researchers count occurrences, statistically test established hypotheses, and generate comparative numerical data with predetermined response categories constitute quantitative research (Denzin & Lincoln, 2011). In qualitative research, the researcher describes the complexity of the occurrences, makes a hypothesis to explore, and produces data using open-ended discussion and observations (Watkins, 2012). A qualitative method was optimal for a doctoral study addressing hospital administrators' strategies that contribute to a successful transition from an older EHR system to a compliant EHR system by an MHS. The quantitative and mixed methods approaches were not appropriate for the study because there were no quantitative components to compare, and no experiment to be conducted (Pan & Tan, 2011).

In case study research, the researcher answers the explanatory questions (Pan & Tan, 2011). Other qualitative designs were not suitable for this research study. Ethnographic studies address the when, where, and how to provide an understanding of an individual's experiences as they relate to cultural assumptions about race, ethnicity, nationality, gender, class, and age (Denzin & Lincoln, 2011). In a phenomenological design, the researcher focuses on the unusual or phenomenological event (Marshall & Rossman, 2016). Furthermore, data collection consists of interviews addressing the lived

experiences of these events, excluding documents and textual data (Marshall & Rossman, 2016). In grounded theory design, the researcher uses the collection of field data to arrive at a central guiding theory (Marshall & Rossman, 2016). A qualitative case study was the best fit for the research question, the current body of knowledge on hospital administrators' strategies for transitioning to the compliant EHR systems at an MHS, and the available data.

Research Question

The overarching research question for the qualitative case study was the following: What strategies do health care administrators use for a successful upgrade to a compliant EHR system at an MHS?

Interview Questions

The 12 study participants responded to semistructured, open-ended interview questions exploring their experiences and knowledge about transitioning from an older EHR system to a compliant EHR system. I reached data saturation 12 interviews. Data saturation occurs when the key issues presented from interviews such as concerns or main ideas are repeated and no new information appears (Hodges, 2011). Data collection and open coding consisted of 12 interviews with a stopping criterion of three interviews without new ideas or themes emerging. Kerr, Nixon, and Wild (2010) suggested testing for data saturation coincides with the interview process. Gaining little to no new information from further interviews is reaching data saturation (Marshall & Rossman, 2016). I maintained the confidentiality of interview participants through the safeguarding of identifying information. Participants responded to the following interview questions:

1. What perceived ease of use (PEOU) considerations were factors for the decision on which HIT to purchase?
2. What perceived usefulness (PU) considerations were factors for the decision on which HIT to purchase?
3. What PEOU considerations facilitated the transition to the interoperable EHR system?
4. What PEOU considerations impeded the transition to the interoperable EHR system?
5. What PU considerations facilitated the transition to the interoperable EHR system?
6. What PU considerations impeded the transition to the interoperable EHR system?
7. How was training an influence on the successful transition from an older EHR to a compliant system in terms of PEOU?
8. How was training an influence on the successful transition from an older EHR to a compliant system in terms of PU?

Conceptual Framework

The technology acceptance model (TAM) provided the conceptual framework for the study. Davis (1993) established the TAM for technology adoption. Researchers in specialized fields applied TAM and found it to be valid; however, Davis's research initially consisted of surveys of the public. Through TAM, Davis increased knowledge of user acceptance and improved the development of information systems. TAM is a

motivational model of the end user for developers of information systems. TAM allows the reader an understanding of how the impact of design choices affects technology acceptance. Increased PU led to increased acceptance of new technology (Davis, 1993). On a scale of importance, PU was more important than PEOU, an additional factor in acceptance (Davis, 1993). The attitude of the potential user indicates whether the user will use the application or not (Davis, 1993). I expected that the propositions advanced with TAM would allow the participants to explore perceptions and experiences regarding the implementation of an EHR system compliant with the HITECH Act of 2009.

Definition of Terms

Electronic health record (EHR): Computer programs, which include features to: (a) schedule appointments, (b) access to decision support, (c) alert medication errors, (d) alert allergies, (e) contain records of a patient's health history, and (f) store the information over time (Seymour, Frantsvog, & Graeber, 2012).

Healthcare provider: A medical professional who provides medical treatment or care example include physicians, nurses, pharmacists, and physician assistants (Chow, Herold, Choo, & Chan, 2012).

Health information technology (HIT): A broad term to encompass the different software and technologies used to collect patient data and assist healthcare providers in providing patient care, managing patient records, and sharing those records with patients and other providers (Pai & Haung, 2011).

Perceived ease of use (PEOU): How easy to use the end user believes the technology to be (Davis, 1993).

Perceived usefulness (PU): “The degree to which an individual believes that using a particular system would enhance his or her job performance” (Davis, 1993, p. 477).

Personal health record (PHR): A record in an electronic format containing relevant health information from an individual’s life such as health problems, medical procedures, allergies, illnesses, family history, immunizations, medications, and laboratory tests (Señor, Fernández-Alemán, & Toval, 2012). The person whom the record belongs to controls access to the record (Señor et al., 2012). The person whom the record belongs to also manages and participates in the healthcare process (Señor et al., 2012).

Assumptions, Limitations, and Delimitations

Assumptions

Assumptions and limitations are foundational supports for a study and when clearly expressed, are used to clarify whether appropriate evidence supports the conclusions (Kirkwood & Price, 2013). Researchers use assumptions to help explain the nature of the phenomenon studied (Sonuga-Barke, 2011). Assumptions are specific to the discipline, or sub-discipline and represent the claims about the phenomenon treated as true, which are unproven (Sonuga-Barke, 2011). Qualitative researchers assume that controlled experiments cannot be used to examine complex social realities (Kirkwood & Price, 2013).

Assumptions and limitations are expressions of the researcher’s attitudes, which could influence interpretation and execution of the findings, giving context to the data collected (Kirkwood & Price, 2013). Assumptions shape the research choices, such as which study to conduct (Kirkwood & Price, 2013). Assumptions are unavoidable because

science is a process conducted by humans who place meaning on experiences and assumptions and provide the language needed to form those meanings (Sonuga-Barke, 2011). Fewer assumptions are better than many assumptions. Assumptions frame questions that are worth asking and that cannot be answered (Sonuga-Barke, 2011).

Five assumptions underlay this case study. The first assumption was that qualitative methodology was appropriate to explore the factors related to a successful transition from an older EHR system to a new EHR system at an MHS. The second assumption was that a single case study would be an appropriate design for the study. The third assumption was that using triangulation in data collection by collecting multiple types of data provided a complete understanding of the phenomena (Crowe et al., 2011; Hyett, Kenny, & Dickson-Swift, 2014). The fourth assumption was that the participants gave answers that were valid and honest. The fifth assumption was that the influence of external factors was insignificant on the answers given by the research participants (Pan & Tan, 2011).

Limitations

The potential weaknesses of a study are the limitations. Researchers conduct studies despite the limitations and assumptions (Kirkwood & Price, 2013). Marshall and Rossman (2016) noted qualitative researchers discuss the limitations of studies to illustrate the trustworthiness of the findings. Clearly expressed limitations and assumptions allow readers to decide whether appropriate evidence supports the conclusions (Kirkwood & Price, 2013). Limitations come from the conceptual framework and study design (Marshall & Rossman, 2016).

The first limitation of this study was the small number of participants included in the sample and the corresponding potential for restriction in the diversity of opinions and perspectives offered. Purposeful sampling was the most appropriate choice for participant selection to identify managers from an MHS involved in the decision, planning, and execution of the transition to the compliant EHR system. Palinkas et al. (2013) explained purposeful sampling is effective for small populations of knowledgeable or experienced individuals to achieve sufficiency and saturation for the study. Participants in this study were from the Pacific Northwest. Participants possessed unique knowledge and experience with the problem of the transition to the compliant EHR system with a high degree of relevancy to the study topic. Many stakeholders had a say in the decision to change EHR systems. These stakeholders included nursing staff, physicians, and external entities, each with insights and perspectives; however, the study included the viewpoints of managers only.

The second limitation was the potential for participant bias and the participant's ability to provide a precise recollection of events related to the interview questions. The third limitation was that the participants may not have been comfortable discussing the factors that led to a successful transition from an older EHR to a new EHR at the participants' MHS and the participants may not have provided accurate accounts of their experiences. Providing study participants with confidentiality may have mitigated this limitation. The fourth limitation was the geographical area of the Pacific Northwest. Time and budget for collecting data were also limitations for the research study.

Researchers choose case study designs to answer the how and why questions and to investigate contemporary phenomena (Pan & Tan, 2011; Yin, 2014). A qualitative case study of factors leading to the successful transition of an MHS to a compliant EHR system was needed to answer the research question. The findings from the study may not be transferable to other geographical settings, other MHSs or other industries.

Delimitations

Delimitations are the factors that researchers have control over and choose to study (Denzin & Lincoln, 2011). Delimitations set the size and scope of the study and make the study accomplishable (Denzin & Lincoln, 2011). The delimitations of the study on an MHS's transition from an older EHR system to a compliant system were, the problem selected for the study, the study location chosen, the sample population, and the sample size.

Researchers identified MHSs transitioning to compliant EHR systems as a problem for the entire U.S. healthcare system (Brooks & Grotz, 2010; Cresswell, Bates, & Sheikh, 2013). Other questions addressing HIT adoption were possible topics for study. Dismissal of alternate questions occurred because researchers had answered these questions.

Significance of the Study

Contribution to Business Practice

The United States is a nation of innovators who use technology to develop better business practices. Despite this standard for using technology, the healthcare industry has lagged behind in implementing information technologies (Brooks & Grotz, 2010). Shaw,

Drucker, and Senge (2013) warned against avoiding change, and maintained that competitive advantage requires quick implementations to keep pace with accelerating change. MHSs have reduced their opportunity to grow and develop because they have not fully adopted the available information technologies.

Brailer (2010) argued widespread adoption of EHR systems would lead to avoidance of medical errors, more efficient use of resources, increased diffusion of knowledge, more consistent care, better information for consumers, increased security for patient information, and improved public health. The qualitative, exploratory case study of the transition from an older EHR system to a compliant EHR system at an MHS may assist other MHSs in transitioning to a compliant EHR system. Findings from the study may contribute to the development of strategies to make implementing new information technology systems proceed more efficiently for the healthcare industry and other industries.

Implications for Social Change

The findings may facilitate successful transitions for other MHSs from an older EHR system to a compliant EHR system. Full use of an interoperable EHR system may improve care coordination for patients with more timely and relevant medical tests, and may reduce duplication of medical tests and procedures (Brailer, 2010). Moreover, the study may help facilitate the adoption of other information technology systems in industries other than healthcare.

A Review of the Professional and Academic Literature

A review of the literature begins with a critical analysis and synthesis of TAM. Next is an overview of the costs of healthcare. The following section addresses the requirements for health records. Next, is a general section on electronic health records. The following section is on EHR failures and success. The final part of the review of the literature is on EHR system transitions.

The compilation of literature for the review included peer-reviewed and other scholarly journal articles and books. The sources used to locate the scholarly articles for the literature review were online databases available through the Walden University library. The databases used included Medline with Full Text, CINALH Plus with Full Text, Nursing with Allied Health Source, ProQuest Central, ScienceDirect, Emerald Management Journals, Sage Journals, Business Source Complete, and LexisNexis Academic. I also used the Google search engine and Google Scholar. Additionally, books from local public libraries and Amazon.com added to the context of the study. The study contains 85.6% peer reviewed articles published within the last 5 years. The literature review contains information from 79 articles, 77 of which are peer-reviewed.

The purpose of the qualitative exploratory single case study was to explore strategies that lead to a successful transition from an older EHR system to a compliant EHR system at an MHS. The study might facilitate an understanding of the influences and strategies needed for successfully implementing EHR systems at an MHS. A review of the literature establishes the context from the published knowledge available on the issue of transitioning to EHR systems.

The strategy used for searching the literature was to find a current and diverse sample of the literature. I looked for medical and technological journals. Authors referenced in previously found journals became keywords to search for current research. An iterative process concluded by reaching saturation as no new information developed through further reading.

Technology Acceptance Model

Development of the model. While completing his degree at the Massachusetts Institute of Technology, Davis began work with the technology acceptance model (TAM). Davis examined user acceptance of electronic mail at IBM. Davis continued his work with TAM at the University of Michigan, Business School. Davis (1993) established a model for technology adoption, by survey of the general working public; however, researchers in specialized fields such as health care also tested and accepted TAM, which increased knowledge of user acceptance and improved the development of information systems. Using TAM, Davis explained how new technology often encounters resistance from users until the demonstration of benefits and ease of use.

Davis (1993) proposed prioritizing information systems for managers because of the costly investment businesses already devote to their managers. TAM was a motivational model of the end user for developers of information systems. With TAM Davis explained how the impact of design choices affects technology acceptance. Perceived usefulness (PU) increased acceptance of new technology (Davis, 1993). Participants rated PU as more important than perceived ease of use (PEOU), an additional factor in acceptance (Davis, 1993). The prospective user's attitudes indicated whether the

user planned to use the application or not (Davis, 1993). Gaining a better understanding of user acceptance and better development of information systems are the goals of TAM research (Davis, 1993).

History of the conceptual framework. Davis, Bagozzi, and Warshaw (1989) found the phenomenon of self-fulfilling prophecy existed. The phenomenon occurred when users who were successful in the past believed they could learn a new technology and the belief in their ability spurred them to give extra effort to learn a new technology (Davis et al. 1989). Davis et al. also found users who had failed in the past and believed they could not learn a new technology, gave less effort towards learning a new technology.

Venkatesh, Davis, and Morris (2007) explained the progression of TAM, beginning with Davis's research in 1985. A period of replication and generalizability occurred from 1992 to 2003, which included studies of populations, countries, technologies, calculators, spreadsheets, and organizational systems (Venkatesh et al., 2007). From 1995 to 2003, researchers established the predictive validity of TAM, further testing the theory. The predictive validity studies included the actual use, the choice, and the intention (Venkatesh et al., 2007). From 1995 to 2005, researchers explored temporal dynamics, gender, age, and other contingencies (Venkatesh et al., 2007). From 1994 to 2000, researchers conducted studies examining determinants and other interventions with TAM (Venkatesh et al., 2007). From 2001 to 2005, researchers focused on construct refinement, synthesis, and alternative mechanisms of TAM for their studies (Venkatesh et al., 2007).

Current research with the conceptual framework. As a well-accepted conceptual framework, researchers continue to use TAM, and many examples are health care related. Kim, Zhang, Yu, Koenigsfeld, and Cichy (2016) applied TAM when examining private club GMs and COOs to learn their perceptions on adopting social media. Kim et al. (2016) surveyed 73 GMs/COOs who were attending a Business Management Institute meeting. Kim et al. found PU was the driver for GM/COO acceptance of social media. Despite finding social media hard to use the GMs/ COOs are adopting the technology because of the usefulness (Kim et al. 2016).

Hsiao and Yang (2011) conducted a quantitative study using bibliometric techniques to evaluate the intellectual structure and trends in the field of TAM. When comparing 72 co-citation studies, Hsiao and Yang found the majority focused on information systems. The second significant trend in the TAM studies was e-commerce (Hsiao & Yang, 2011). The popularity of mobile devices has created another avenue of E-commerce for investigations (Hsiao & Yang, 2011). User enjoyment was the key to the trend of users participating in the online games and E-commerce activities (Hsiao & Yang, 2011).

Sezgin and Özkan-Yıldırım (2015) conducted a cross-sectional investigation of Turkish pharmacists' acceptance of HIT. Sezgin and Özkan-Yıldırım survey 2169 pharmacists from 77 cities in Turkey. Sezgin and Özkan-Yıldırım found PU was the most significant factor of HIT acceptance with PEOU as the next factor of significance.

Jan and Contreras (2011) conducted a longitudinal qualitative study of technology acceptance in university engineering students, using TAM. Experts in the industry

continue not to accept new technologies, regardless of the effectiveness and monetary expense of the new technology (Jan & Contreras, 2011). Jan and Contreras confirmed PU influenced attitudes toward new technology, and PU influenced behaviors of intention to use the new technology. Further, Jan and Contreras found subjective norms influenced users' attitudes toward technology and their intentions to use new technology. These relationships explained how perceived and observed usefulness was the basis for student technology use (Jan & Contreras, 2011). Professors' and classmates' expressed attitudes that also affected perceived and observed usefulness (Jan & Contreras, 2011).

Engineering students did not see a technology lacking PEOU as a reason not to use the technology (Jan & Contreras, 2011). Jan and Contreras (2011) found engineering students understood they would be learning new technologies throughout their careers. Moreover, the researchers suggested engineering students developed their skills to overcome the perceived difficulty (Jan & Contreras, 2011). Jan and Contreras recommended web pages to highlight their usefulness. Jan and Contreras also suggested training as a permanent process because new technologies are continually emerging.

Lin, Fofanah, and Liang (2011) conducted a quantitative study of Gambian citizen adoption of e-government based with TAM. The researchers surveyed 167 participants and found the TAM variables had a strong influence on their intent to use the e-government systems. The quality of the information and PEOU positively influenced PU. Lin et al. found the relationship between behavior intentions and PU was not strong. In addition to the new technology, Gambia has an unreliable electrical system, which may have played a role in the lack of PEOU. Further, Gambians needed hours to access

browsers to navigate the required websites because of slow internet connections (Lin et al., 2011). Lin et al. determined the Gambian government's lack of infrastructure was a factor in the unsuccessful e-government initiative. The Gambian citizens reported a preference for the traditional government processes over the e-government because of the unreliable internet (Lin et al., 2011).

Pai and Haung (2011) conducted a quantitative study using a 5-point Likert scale of health care providers' intention to use new EHR systems. The researchers found nurses needed HIT because of an increase in the severity of patient illness. The increase in the severity of patient illness placed a higher demand on nursing time for the care of a patient reducing the time available for charting the patient's health record (Pai & Haung, 2011). The nurses participating in the study exhibited positive feelings about the new technology if they believed the new technology was good for their job performance (Pai & Haung, 2011). Their findings indicated that PU and PEOU significantly affected users' intention to use, with a path coefficient of 0.498 and *p*-value of 0.001, supporting Pai and Haung's hypotheses. Pai and Haung concluded PEOU was the most significant factor in the acceptance of new HIT systems. This was a variation from most TAM research, which indicated PU was a stronger influence on technology acceptance than PEOU, especially for the use of technologies relating to work.

Moore (2012) surveyed 283 health care workers, regarding their acceptance of HIT. Moore found compatibility with workflow was an additional description for PEOU. Low compatibility led to low levels of use, the feeling of frustration, and the potential for aggressive resistance. The system Moore studied had a requirement of

mandatory use, which negated the significance of the level of use for determining intention to use, PU or PEOU. Moores found PU was a dominant factor for system use, and PU should be the priority of any information system to provide the user with the functionality needed to do his or her job. Additionally, the quality of information and the perception of technical support or skill available to the user were both strong influences on PU and PEOU (Moores, 2012). Moores (2012) concluded the workflow compatibility of a system determined the success of the system.

Ketikidis, Dimitovski, Lazuras, and Bath (2012) examined 133 physicians and registered nurses using HIT exploring how TAM was applied to the health care field. Through an anonymous questionnaire sent out nationally, Ketikidis et al. found a modification of the original TAM to be more applicable to the health care environment. PEOU, job relevance, and social norms were integral to gaining the acceptance of new technology users (Ketikidis et al., 2012). The addition of social expectations was crucial for new information technology campaigns (Ketikidis et al., 2012). Ketikidis et al. recommended educational programs include information about how the programs will improve the health care provider's efficacy and competency skills with computer interactions (Ketikidis et al., 2012).

In their study on user acceptance of events on Facebook, Lee, Xiong, and Hu (2012) found perceived enjoyment increased use of new technological tools. This emotional connection could increase PEOU and PU, which were crucial to user acceptance (Lee et al., 2012). Lee et al. advocated for providing demonstrations of how

technology may benefit users, for increasing user acceptance of the technology. Lee et al. found PEOU and PU had no significant effect on user's attitudes for the use of Facebook.

Hsieh (2014) found PU was significant for increasing acceptance for work uses in his study of Taiwanese. Attitude for acceptance related to PEOU, PU, and compatibility (Hsieh, 2014). Hsieh indicated the factors affecting recreational technology use differed from the factors affecting work technology use. PEOU was a minor influence on the acceptance of technology at work.

Chow et al. (2012) conducted a quantitative study based on TAM of nursing students' use of an e-learning tool, second life, for learning rapid sequence intubation. Chow et al. examined factors affecting nursing students' decisions to use the e-learning tool to learn rapid sequence intubation, through surveying 206 nursing students. The 206 participants answered a survey with questions based on a 7-point Likert scale (Chow et al., 2012). Chow et al. (2012) found both computer self-efficacy and PEOU had a significant effect on the PU of the e-learning tool. The students reported a lack of PEOU for the virtual ward (a fictional hospital ward for the nursing students to learn and work in, which is part of the second life program) (Chow et al., 2012). The students scored the virtual ward 4 on a Likert-scale of 1 to 7; 7 was the highest PEOU (Chow et al., 2012). The results of the study reinforced Pai and Haung's TAM findings that PEOU was the strongest factor in PU and behavioral intentions to use new technologies (Chow et al., 2012; Pai & Haung, 2011).

Alternative conceptual framework. The institutional choice framework was an alternative conceptual framework considered for the qualitative exploratory single case

study to explore strategies that lead to a successful transition from an older EHR system to a compliant EHR system at an MHS. The institutional choice framework builds on the assumption that acknowledging institutional cultures and rules constrain the decision-making capabilities and social behaviors of individuals or groups, which the framework calls agents (Ostrom, 2014). Institutional choice framework researchers examine the interactions among institutional structures, agent decision-making processes, and material resources to see if incentives and disincentives change the agent's behaviors (Ostrom, 2014). Using the institutional choice framework to conduct the study to explore strategies that lead to a successful transition from an older EHR system to a compliant EHR system at an MHS is a valid choice. However, the study was about the adoption of technology; therefore, TAM was a better choice for exploring these questions.

Cost of Health Care

Health care spending was a problem in the United States. This section contains a discussion of national statistics for health care costs, direct expenses for health care costs, and indirect expenses for health care costs. Also included is an explanation of how the costs of health care weigh on the nation and individuals.

National statistics. Qaseem et al. (2012) found health care spending grew to \$2.2 trillion in 2008. Unsustainable costs of health care continued to rise (Hood & Weinberger, 2012). In 1980, the United States spent \$253 billion on health care (Qaseem et al., 2012). In 1990, the United States spent \$714 billion on health care (Qaseem et al., 2012). Auerbach and Kellerman (2011) found health care costs increased at a rate of 5.2

% per year from 1999-2009. Hood and Weinberger predicted the United State's health care spending to reach \$4.6 trillion in 2020.

The United States spends more on health care than any other country (Hood & Weinberger, 2012). Gabow, Halvorson, and Kaplan (2012) found federal health care costs were \$950 billion in 2012, becoming the largest contributor to the national budget deficit. Hood and Weinberger (2012) found health care costs doubled in the percentage of GDP between 1980 and 2011.

Health care expenses reached unsustainable levels at 18% of the gross domestic product, with predictions of 20% by 2020 (Berwick & Hackbarth, 2012). Switzerland's 10.8% of GDP ranked as the third most expensive for health care spending of the 30 Organization for Economic Co-Operation and Development countries (Reich, Weins, Schusterschitz, & Thöni, 2012). Brody (2012) stated cost escalations in the United States were because of technological advances and an aging population. McCormick, Bor, Woolhandler, and Himmelstein (2012) agreed historically, using new technology in the health care industry has led to an increase in health care costs.

Direct expenses. The use of outdated techniques increased the cost of care by an estimated \$42 billion in 2011 (Berwick & Hackbarth, 2012). As well as uncoordinated care, which was estimated to have cost \$25 billion to \$45 billion in 2011 (Berwick & Hackbarth, 2012). Additionally, overtreatment, which costs \$158 billion to \$226 billion (Berwick & Hackbarth, 2012). Charges for health care tests or procedures are several times what the same health care or tests cost in other countries because of the lack of

transparency in the US (Berwick & Hackbarth, 2012). Berwick and Hackbarth (2012) estimated \$84 billion to \$178 billion for overpriced tests or procedures in 2011.

Van Den Bos et al. (2011) studied the costs of medical errors in the United States and determined the annual cost was 17.1 billion dollars. These were the actual medical expenses, not the ancillary cost of malpractice insurance or lawsuits, in determining this figure (Van Den Bos et al., 2011). Van Den Bos et al. noted health care costs were rising everywhere; however, the rate was rising faster in the United States.

Health care spending for the typical American family, married with two children, employer-sponsored health insurance and earnings of approximately \$79,000 in 1999; nearly doubled from 1999-2009 (Auerbach & Kellermann, 2011). Gabow et al. (2012) found rising health care costs had eliminated any gains in income for US families. The monthly health care spending for this typical family went from \$805 to \$1420, almost doubling while their annual earnings only rose 2.6% per year (Auerbach & Kellermann, 2011).

Patients with the same diagnosis received different treatments (Cutler & Ly, 2011). In the United States, a patient diagnosed with a heart attack has a two times greater chance of receiving a coronary bypass than a similarly diagnosed patient in Canada (Cutler & Ly, 2011). Cutler and Ly (2011) estimated these differing treatments accounted for 14% of total health care spending.

Indirect expenses. Not coordinating care, when patients receive treatment in an inefficient and incorrect way because of lack of coordination between providers (Berwick & Hackbarth, 2012). Berwick and Hackbarth (2012) estimated costs of \$25 billion to \$45

billion in 2011. Berwick and Hackbarth (2012) found the lack of coordinating care led to patients with worsened conditions resulting in hospital readmissions, increased disability, and increased dependence.

Also, overuse of health services contributes to the high cost and inefficiencies of the US health care system (Chan, Chang, Nassery, Chang, & Segal, 2013). Overuse of treatments posed significant health risks to the safety and health of individuals and the entire population (Chan et al., 2013). Providing unnecessary care not only opens exposure to potential harm for the patient receiving the care but also reduces the resources available to others (Hood & Weinberger, 2012).

Brody (2012) asserted the health care industry must acknowledge the existence of a limited supply of health care, especially considering the small number of primary care providers in the United States. Spending on interventions not benefiting patients was a larger problem, reaching approximately 30% of health care spending (Brody, 2012). This type of waste in health care goes far beyond fraud as interventions, which do not benefit patients not only takes resources but may decrease patients' quality of life (Brody, 2012).

Not adopting HIT, decreased productivity and added to the financial burden on the health care industry (Nahai, 2011). Additionally, not standardizing billing forms and billing procedures, the result of a multiple payer systems was estimated to cost between \$107 billion and \$389 billion (Berwick & Hackbarth, 2012). The multi-payer system lacked standards for credentialing and billing, created inefficiencies, and increased administrative costs (Cutler & Ly, 2011).

Moriates, Shah, and Arora (2013) asserted many Americans were undergoing financial hardship because of their medical bills. Even with the affordable care act, many Americans had high deductible plans (Moriates et al., 2013). Rising health care costs had eliminated any gains in income for US families (Gabow et al., 2012). Uninsured Americans had a declining life expectancy. American deaths from treatable conditions had only fallen by 5% in the United States while other high-income countries had decreases of 10-25% (Auerbach & Kellermann, 2011).

The escalating costs of insuring employees was a threat to the competitiveness of US businesses (Gabow et al., 2012). Berwick and Hackbarth estimated costs of \$82 billion to \$272 billion for fraud and abuse in, 2011. Brody (2012) exerted waste, fraud, and abuse accounted for less than 10% of health care costs. Therefore, total health care costs in 2012 were between \$820 billion to \$2.72 trillion.

Legislation Promoting EHR Adoption

Nahai (2011) found the medical field was slow to use information technology. Even though, these EHR systems were available since the 1990s with their potential benefits; paper chart systems remained prevalent in hospitals and medical practices in the USA (Jha, DesRoches, Kralovec, & Joshi, 2010). This failure to adopt new technology for patient medical records or EHR led to a lack of productivity, which created a financial drain on the health care industry (Nahai, 2011). U.S. policymakers made promoting HIT a key priority, with the goal of achieving improved quality and health care cost containment (Jha et al., 2010).

Two pieces of legislation have influenced EHR system implementation in the United States. The legislations were the Health Information Technology for Economic, and Clinical Health (HITECH) Act, which is part of the American Recovery and Reinvestment Act of 2009, and the Patient Protection and Affordable Care Act (ACA) of 2010 (Weiss & Nunes Amaral, 2013). In the US, the health care industry has lagged behind other industries in using IT that promoted improved quality and efficiency (DesRoches et al., 2013; Nahai, 2011; Weiss & Nunes Amaral, 2013). Barriers to EHR implementation included technical complexity, nonexistent economic incentive, and interoperability issues (Weiss & Nunes Amaral, 2013).

In 2004, federal policymakers attempted to increase the use and adoption of HIT (DesRoches et al., 2013). The American Recovery and Reinvestment Act of 2009 launched broad federal initiatives for biomedical and comparative effectiveness research, HIT adoption, and protection of patient information (DesRoches et al., 2013).

The American Recovery and Reinvestment Act directed \$150 billion to the health care industry (Steinbrook, 2009). Congress budgeted \$86.6 billion for Medicaid Federal Medical Assistance (Wilson, 2012). Of these funds, \$19.2 billion was for HIT, \$650 million for preventative health care and wellness support, and \$500 million to train health professionals (Steinbrook, 2009). The roughly \$20 billion budgeted for HIT comes in the form of direct grants and incentives for adoption and meaningful use (DesRoches et al., 2013; Parsons, McCullough, Wang, & Shih, 2012).

Congress passed the HITECH Act, in 2009 to increase the use of EHR to improve population health in America (Steinfeld & Keyes, 2011). Additionally, Congress planned

that the HITECH Act would fix the problems with the decentralized, open market EHR system, which developed in the United States (Weiss & Nunes Amaral, 2013). The HITECH Act provides approximately \$27 billion in incentives for implementation to Medicare and Medicaid providers who meet meaningful use (Chiang et al., 2011; Weiss & Nunes Amaral, 2013).

The American Recovery and Reinvestment Act of 2009 was legislation to increase the use of HIT (Noblin et al., 2013). HIT is more than a health record HIT includes storing data, diagnostic assistance, and data acquisition software (Noblin et al., 2013). The continued high use of paper records in the US necessitated the legislation (Noblin et al., 2013). Noblin et al. (2013) found 17% of hospitals and 10% of physicians were using HIT before the passage of the American Recovery and Reinvestment Act of 2009. In 2008 less than one in five, US hospitals had EHR systems (Weiss & Nunes Amaral, 2013).

President Bush signed an executive order in 2004, which created the Office of the National Coordinator for HIT (Steinbrook, 2009). The American Recovery and Reinvestment Act validated the decision to develop this position by budgeting \$2 billion annually for the office to spend on grants and loans (Steinbrook, 2009). The budget adjustment tremendously increased the office's fiscal responsibilities (Steinbrook, 2009). The act also established a goal for the office, for each person in the United States to have an EHR by 2014 (Steinbrook, 2009). The American Recovery and Reinvestment Act of 2009 requires physicians in outpatient settings to implement and use fully functioning

EHR systems to meet federal requirements for “meaningful use” (McAlearney, Robbins, Kowalczyk, Chisolm, & Song, 2012).

The American Recovery and Reinvestment Act modified HIPAA by allowing patients to have access to electronic copies of their health records (Steinbrook, 2009). Patient copies of health records had traditionally been a printed copy of the health record in the past (Steinbrook, 2009). The American Recovery and Reinvestment Act of 2009 also required encryption of patient information when transmitted to a wireless device (Steinbrook, 2009). Additionally, the American Recovery and Reinvestment Act of 2009 requires limits the sale of patient health information prohibits using patient information for fundraising or marketing, and increases enforcement and oversight (Steinbrook, 2009).

Meaningful use was a standard physicians and hospitals must meet (Jha et al., 2010). Meeting meaningful use showed physicians and hospitals were using HIT in a manner to improve the quality, safety, and efficiency of patient care (Jha et al., 2010). The government set out 14-core objectives that hospitals must meet to qualify for the financial incentives (Jha et al., 2010). In addition to the 14-core objectives, hospitals must choose five items to meet from a list of an additional 10 criteria (Jha et al., 2010).

Meaningful use is a three-stage system developed to create sophisticated EHR usage (Weiss & Nunes Amaral, 2013). Stage, one of meaningful use, is capturing data; stage two of meaningful use is increasing coordination of care. Moreover, stage three of meaningful use is improving patient outcomes (Weiss & Nunes Amaral, 2013). Sittig and Singh (2012) countered the goals of the three phases of meaningful use were: addressing

safety concerns unique to EHR technology, mitigating safety concerns which arose from failures to use EHR appropriately, and to use EHR for monitoring and improving patient safety.

Without meaningful use, the creators of the ACA risked incentivizing volume over outcomes (Weiss & Nunes Amaral, 2013). Over 50% of providers and 80% of short-term acute care hospitals had received incentive payments and became meaningful users (Weiss & Nunes Amaral, 2013). Federal policy makers used scientific evidence indicating that the use of electronic prescribing and decision support improved the quality of health care (Jha, 2010). Jha (2010) concluded combining interoperability with improved quality of care resulted in reduced health care costs. However, the health care industry was resistant to sharing patient information and interoperability progressed slowly (Weiss & Nunes Amaral, 2013).

Jha et al. (2010) used data collected by the American Hospital Association to answer questions about hospitals and the meaningful use criteria. The American Hospital Association surveyed 4,493 acute care nonfederal hospitals (Jha et al., 2010). Meaningful use regulations require the collection of demographic information, age, sex, race or ethnicity, and preferred language (Jha et al., 2010). Most hospitals with HIT systems did not collect these types of demographics, before the passage of the HITECH Act (Jha et al., 2010). Only 11.9% of hospitals had HIT in 2009 (Jha et al., 2010).

The majority of U.S. hospitals had to adopt HIT to meet the federal goals and meaningful use criteria (Jha et al., 2010). Critical access, small and medium-sized public nonteaching and rural hospitals had low rates of HIT adoption (Jha et al., 2010). Only

2.7% of hospitals met the full criteria for meaningful use in 2009 (Jha et al., 2010). Few studies existed on hospitals' adoption of HIT since the American Recovery and Reinvestment Act of 2009 passed (Jha et al., 2010).

The American Recovery and Reinvestment Act of 2009 financially incentivized the implementation of EHR systems on a decreasing scale to doctors and hospitals that meet meaningful use (Cantiello & Cortelyou-Ward, 2010). The American Recovery and Reinvestment Act of 2009 financially penalized the hospitals and doctors that do not meet meaningful use (Cantiello & Cortelyou-Ward, 2010). Physicians would receive \$15 thousand in 2011, \$12 thousand in 2012, \$8 thousand in 2013, \$4 thousand in 2014, and \$2 thousand in 2015 (Cantiello & Cortelyou-Ward, 2010). Physicians who chose not to implement EHR systems will receive 99% of their Medicare payments in 2015, 98% of their Medicare payments in 2016, and 97% of their Medicare payments in 2018 (Cantiello & Cortelyou-Ward, 2010).

Cantiello and Cortelyou-Ward (2010) noted one practice with four physicians actualized a \$5500 per month savings in the first eight months of use. The practice experienced a savings of \$6800 per month the following year (Cantiello & Cortelyou-Ward, 2010). The four physicians also saved \$7000 in office supplies in a 15-month period (Cantiello & Cortelyou-Ward, 2010). The cost of the system was \$22 thousand per physician (Cantiello & Cortelyou-Ward, 2010). The practice also had more timely payments and fewer no-shows with using the system (Cantiello & Cortelyou-Ward, 2010).

The American Recovery and Reinvestment Act of 2009 included a section on establishing a Federal Coordinating Council for Comparative Effectiveness Research, composed of 15 or more federal officials, half of which must be medical professionals (Steinbrook, 2009). The Federal Coordinating Council for Comparative Effectiveness Research recommends and coordinates research, but the council cannot establish clinical guidelines or mandates (Steinbrook, 2009). The rationale was that the government should promote the research that health care providers use to create clinical guidelines; the government does not want to tell physicians how to treat patients (Steinbrook, 2009). The ACA removed many barriers to health promotion in the United States by guaranteeing access to health care for Americans (Berwick & Hackbarth, 2012). The ACA provided an incentive to physicians to change health care delivery, changing the focus from quantity to quality of care (Steinbrook, 2009).

The ACA provided financial support to physicians to encourage physicians to use EHR (Wolf, Harvell, & Jha, 2012). Under the ACA, health care providers could electronically research whether insurance covered a laboratory test, how much of the patient's bill insurance covered, and what portion of the bill was the patient's responsibility (Steinbrook, 2009). Steinbrook (2009) projected these changes would save the government \$20 billion over the next 10 years. Additionally, projections indicated hospitals, physicians, and insurers would save even more (Chiang et al., 2011). Hospitals and health plans more easily afforded HIT than single physicians did (Wolf et al., 2012).

The main reason for the passage of legislation to support EHR adoption was EHR adoption had the potential to improve every facet of patient care (Cantiello & Cortelyou-

Ward, 2010). Weiss and Nunes Amaral (2013) found EHR systems had advanced capabilities such as early lung cancer diagnostics. Cantiello and Cortelyou-Ward (2010) attested EHR decreases medical errors and believed this feature alone was worth the monetary investments needed for these systems. Health care facilities planning to offer optimal care to their patients must properly manage their information resources (Cantiello & Cortelyou-Ward, 2010).

Cutler and Ly (2011) noted the legislation had not adequately addressed the multi-payer system with its innate inefficiencies. Insurance companies spread the costs of different billing and credentialing procedures across their customers, removing any incentive to standardize (Culter & Ly, 2011). Additionally, the complicated billing procedures could have created savings in denied claims, which were submitted incorrectly (Cutler & Ly, 2011).

Electronic Health Records

EHR would rehabilitate the health care industry (Seymour et al., 2012). EHRs provided longitudinal patient health histories, from every provider the patient's visited (Seymour et al., 2012). EHRs include laboratory results and health care tests administered as well as physicians' notes (Seymour et al., 2012).

Early EHR adopters. In an online survey, Pizzi et al. (2005) researched physician opinions on electronic prescribing systems. Changes in Medicare to include some drug coverage were the focus of the study (Pizzi et al., 2005). Pizzi et al. explored the changing Medicare requirements regarding electronic prescribing systems. Only half of the physicians surveyed believed the need for e-prescribing existed (Pizzi et al., 2005).

The other half felt handwritten prescriptions were the best practice and physicians did not need to learn about the other systems (Pizzi et al., 2005). Pizzi et al. found 50% of respondents did not want electronic prescribing.

Resistance to electronic prescribing came from the inefficiencies that electronic prescribing created (Pizzi et al., 2005). The time required for installing the systems and the disruption to patient care workflow caused inefficiencies in the health care practices (Pizzi et al., 2005). Physicians were resistant because of slight misplacement of the cursor could lead to the selection of the wrong medication. Pizzi et al. recommended electronic prescribing systems become more facile than the current electronic prescribing systems. After the programs become easier to use, more health care systems will purchase the programs (Pizzi et al., 2005).

Kazley, Diana, and Menachemi (2011) examined EHR use at hospitals in the United States. The datasets were from the American Hospital and Health Information Management System Society (Kazley et al., 2011). Kazley et al. found more inconsistency than consistency in the data sets. Kazley et al. noted few hospitals in the United States had adopted EHR systems despite the national attention EHRs received for the EHR's potential to increase quality care.

Schnall, Gordon, Camhi, and Bakken (2011) expressed EHR systems were tools, which could help case managers coordinate care for persons with HIV. HIV was a condition, which required many health providers to coordinate their efforts for the good of the patients, as with many other chronic diseases (Schnall et al., 2011). Schnall et al. found case managers did not have confidence in the computer systems operating correctly

or the information included in the records the computer systems stored. Once the initial learning phase passed, the case managers said the EHR system improved their workflow, which was contradictory to other medical staff's opinions (Schnall et al., 2011). The case managers had difficulty gaining critical health care information for their patients and having access to this information from one source was helpful to their workflow (Schnall et al., 2011).

Impediments to EHR adoption. Barriers to the adoption of EHR systems by medical staff were problems for the health care industry (Nahai, 2011). According to Tucker, Higginbotham, and Parton (2012), the national average for rates of EHRs usage was 13% to 44% of family medicine physicians. DesRoches et al. (2013) found a 3% increase in basic EHR use between 2008 and 2010. These low rates of usage continued even after Medicare had created incentives for increased payment to physicians who meet meaningful use levels (Brailer, 2010).

Cost, productivity issues, data security, and challenges of integrating new and existing technology systems caused low adoption rates of EHR in the United States (Brooks & Grotz, 2010). Chao, Hu, Ung and Cai (2012) listed a lack of standards for recording clinical information, high costs of implementation and system maintenance, physician ambivalence toward clinical and financial benefits, privacy and confidentiality concerns, and legal liability concerns as barriers to EHR adoption. Further, Weiss and Nunes Amaral (2013) found barriers to EHR implementation included technical complexity, nonexistent economic incentives, and interoperability issues.

Luxford, Safran, and Delbanco (2011) interviewed 40 individuals from eight US hospitals from geographically dispersed locations and found nine factors for improving patient care. The factors are: (a) strong, committed senior leadership, (b) the communication of the strategic vision, (c) the engagement of patients and families, (d) a sustained focus on employee satisfaction, (e) regular measurement, (f) adequate staffing for care delivery redesign, (g) building staff capacity to support delivering patient-centered care, (h) accountability and incentives, and (i) a culture strongly supportive of change (Luxford et al., 2011). Both, provider focused care, and the time required for a change to patient-focused care were the barriers to patient-centered care (Luxford et al., 2011).

The transformation time to patient-centered care was longer than the time anticipated (Luxford et al., 2011). Luxford et al. (2011) noted the participants did not discuss office design, architecture, and how these variables affect patient care. Additionally, Luxford et al. (2011) noted the lack of mention of how EHRs may affect patient care. Health care professionals viewed information technology as supportive of administrative functions and clinic management, but not required for improving patient care (Luxford et al., 2011).

Austrian, Adelman, Reissman, Cohen, and Billett (2011) conducted a retrospective study of a specific EHR system. The EHR system studied, alerted physicians when a patient's platelet level dropped to 50% and the patient experienced a heparin exposure (Austrian et al., 2011). Austrian et al. found the alert changed physician behavior, but the alert did not result in improved outcomes for patients. There were no

significant difference in morbidity rates for patients with the alert and those without the alert (Austrian et al., 2011).

Positive consideration for EHR adoption. Hsieh (2014) supported an integrated national EHR system because they were more efficient and more cost-effective for the health care industry than the current, divided EHR systems. Hsieh studied physician's EHR acceptance at hospitals and medical centers in Taiwan. Hsieh reported implementing an electronic data exchange for health care records could aid in increasing quality of patient care and controlling costs, especially considering the high level of hospital shopping which occurred in Taiwan. Managers must find techniques to gain physician's trust and acceptance of EHR (Hsieh, 2014).

Health care policy makers believe computerization of health care records will lead to improved quality and lower costs for health care (Parsons et al., 2012). Brooks and Grotz (2010) found strong support from senior management coupled with implementation leadership from key physicians was vital to the adoption. Sloppy handwriting caused medical errors in order entry and prescriptions. EHR is an excellent tool to reduce medical errors (Seymour et al., 2012). Furthermore, after Hurricane Katrina had destroyed the health records of one million people, many health care providers began to see the benefits of an electronic record system (Brooks & Grotz, 2010).

The successful implementation of an EHR system allowed multi-direction communication of health information among providers, researchers, patients, and policymakers (Weiss & Nunes Amaral, 2013). These communications eliminated unnecessary laboratory tests, increased health care provider collaboration, and reduced

health care costs (Weiss & Nunes Amaral, 2013). The result was system-wide improvements in patient care.

Gilmer et al. (2012) studied diabetic patients in the United Kingdom, to determine whether EHR with clinical decision support would reduce medical expenses. Doctors used the program, Diabetes Wizard a decision support system, in office visits for the study (Gilmer et al., 2012). Doctors entered patient information into Diabetes Wizard, which printed a suggested course of treatment for the doctor's review (Gilmer et al., 2012). Gilmer et al. (2012) found a decrease in A1C of 0.26% after one year. Gilmer et al. (2012) found savings of \$57.00 annually per patient. This figure accounted for the cost of the software, programmer time and increased physician time learning to use the program, and the moderate improvement in patient health (Gilmer et al., 2012). The majority of the savings were from decreased medication expenses (Gilmer et al., 2012).

Astley, MacDougall, Davidson, and Chew (2011) performed a cross-sectional study in Australia, examining quality improvement systems, tools, resources, and workforce across 35 hospitals. Astley et al. (2011) found facilities, which followed the established procedures (specifically the electronic patient check out and electronic decision support tools) experienced a decrease in post-discharge adverse outcomes for patients. However, a large percentage of providers, 43% did not use the patient check out, and electronic decision support tools (Astley et al., 2011).

Bowles et al. (2011) studied the effects of telemedicine on cardiac patients to reduce hospital readmissions. Telemedicine consisted of tools and providers checking in on patients at home through telecommunication technologies. Bowles et al. stated

symptoms such as weight gain and edema were present eight to 12 days before hospital admissions or readmissions. Bowles et al. found a 3% reduction in readmissions after 30 days, by replacing 45% of the home health visits with telemedicine visits; further, they found a 6% reduction after 60 days. The findings were tremendously encouraging because a reduction of 5% nationally could save Medicare \$5 billion annually (Bowles et al., 2011).

Incentives for EHR adoption. Subinoy et al. (2011) researched the incentives established by the American Reinvestment Act for practices with at least 30% of their patients having Medicare (not including children's health programs). From these practices, Subinoy et al. (2011) searched for those providers, which had 80% of their records entered into their electronic record systems with at least one diagnosis and one medication listed. The physicians or hospitals must enroll between 2010 and 2014. Late enrollments reduced incentives. The full incentives were available through October 2012 (Subinoy et al., 2011).

The penalty for practices not meeting meaningful use is that Medicare will decrease payments by 1% in 2015 up to 3% in 2017 (Noblin et al., 2013). Congress focused on health outcomes for patients and tied the incentives and penalties for meaningful use (McAlearney et al., 2012). Long-term acute care hospitals, rehabilitation hospitals, and psychiatric hospitals did not qualify to receive HITECH Act incentives (Wolf et al., 2012). Wolf et al. (2012) used the data from the 2009 health IT supplement to the American Hospital Association survey. Wolf et al. (2012) found only 4% of long-term acute care hospitals and 2% of psychiatric hospitals had adopted a basic EHR

system. Wolf et al. (2012) stated facilities ineligible for incentives were not likely to catch up with the national requirements for meaningful use when phase two begins.

Adler-Milstein et al. (2011) studied regional health information organizations during 2009. Of the 167 regional health information organizations to complete the survey, only 13 met stage one of meaningful use (Adler-Milstein et al., 2011). Health care organizations were resistant to paying for HIT because many of its benefits go directly to payers (Adler-Milstein et al., 2011).

Health outcomes with EHR. Weiss and Nunes-Amaral (2013) stated EHR systems have advanced capabilities to detect and assist in diagnosing early-stage lung cancer. Both patient and population health outcomes were improved with the use of EHR systems (Cusack et al., 2013). These improvements resulted in EHR systems becoming an essential technology for improvements in health care (Cusack et al., 2013).

Ivers, Pylypenko, and Tu (2011) explored the expansion of EHR systems use. Ivers et al. (2011) created a computer program to sort through the patient information looking for patients who met a selected set of criteria. With this computer program, Ivers et al. identified individuals with Ischemic Heart Disease (Ivers et al., 2011). The false positive rate was low at 13% and identified with physician workups as such (Ivers et al., 2011). This system was a method for improving health outcomes through EHR (Ivers et al., 2011). Ivers et al. (2011) determined not having a consistent system nationwide increased the resources needed to identify patients with Ischemic Heart Disease and placed the US behind other developed nations.

Patient perceptions of EHR. Archer, Fevrier-Thomas, Lokker, McKibbin, and Straus (2011) asserted patients find value in EHR. Archer et al. (2011) noted patients show increased satisfaction with PHR. The researchers found patients especially appreciated the access to the records in times of emergencies (Archer et al., 2011). Archer et al. suggested most people would pay less than \$5.00 a month for this access. Archer et al. further suggested people with chronic diseases found more value to the PHR and would pay a higher premium.

Señor et al. (2012) found 91% of Americans were worried about the privacy and security of their health information. Patients wanted to be able to find and easily understand the privacy policy of the PHR (Señor et al., 2012). Most PHRs meet these basic requirements 23 of the 24 PHRs examined, had clearly written privacy policies (Señor et al., 2012). However, only five of the PHRs defined the kinds of permissions allowed to insurance companies and pharmacies (Señor et al., 2012). Only six of the PHR systems complied with HIPAA, while another four had statements in the privacy policy that HIPAA did not cover the information in the PHR (Señor et al., 2012).

Señor et al. found security issues in the PHR systems in the study. Few PHR systems allowed patients to check who else has accessed their information (Señor et al., 2012). Señor et al. found 38% of the PHR systems examined in the study used cookies. The use of cookies increased the chance of identity theft by automating the authentication data, which made the authentication data vulnerable to interception by hackers (Señor et al., 2012). PHR systems were also a source of research data (Señor et al., 2012).

Of the PHR systems examined, 13% ensured the patient identification could not occur from de-identified research data (Señor et al., 2012). Additionally, only 17% encrypted the electronic data to secure the data for both physical and electronic security measures (Señor et al., 2012). Señor et al. explained more than 63% of PHR documents were vulnerable from affected web applications in 2008. Physicians also had resistance to using PHR data. Connecting PHR and EHR would give a complete data management system for patients (Señor et al., 2012). However, physicians did not want to allow patients to control their health record (Señor et al., 2012). Physicians worry about the possibility of PHR hackers and modifications; physicians cannot trust the correctness of the data in a PHR (Señor et al., 2012).

Drawing on social network research, Sykes, Venkatesh, and Rai (2011) examined EHR system use and consequent performance (patient satisfaction) among physicians during early stages of the implementation of an EHR. The study found the early stage in the use of the system was essential to the acceptance and functional use by physicians (Sykes et al., 2011). Sykes et al. (2011) called this time the shakedown phase and found extensive training increased responses of ease of use and usefulness of the system. Additionally, Sykes et al. found social pressure from other physicians also increased functional use. Furthermore, Sykes et al. (2011) found an increase in patient satisfaction with the use of EHR.

Gaylin, Moiduddin, Mohamoud, Lundeen, and Kelly (2011) surveyed United States households and found 56% of respondents believed e-prescribing would cut medical costs. Additionally, 58% of respondents believed PHRs reduced medical costs,

and 71% believed PHR could improve patient health care (Gaylin et al., 2011).

Physicians may be more inclined to use EHR if their patients show appreciation for EHR than if patients show no appreciation for EHR (Gaylin et al., 2011).

Patel et al. (2011) conducted 252 phone interviews with health care consumers. Patel et al. found consumers were interested in PHRs. Consumers feel PHRs may be helpful for improving personal health (Patel et al., 2011).

A computer divide existed; people were either people who know how to use computers or people who do not know how to use computers (Patel et al., 2011). The people without computer skills were not interested in EHRs (Patel et al., 2011). Affluent patients were more appreciative of the technology, and their physicians needed fewer incentives for the use of EHRs (Gaylin et al., 2011). Low-income populations were less aware of the benefits of EHRs and showed less appreciation for EHRs to their physicians; therefore, these physicians required more incentives (Gaylin et al., 2011).

Ahern, Woods, Lightowler, Fineley, and Houston (2011) researched the benefits available to patients through EHR. Medicare and Medicaid meaningful use criteria require physicians to meet criteria of set objectives (Aherns et al., 2011). Two patient-centric objectives for meaningful use were first the use of EHR to identify and provide patient-specific education resources as appropriate and sending reminders to patients for preventative and follow-up care, and second providing patients timely access to their health information (Aherns et al., 2011).

Aherns et al. (2011) discovered three ways patient get their health care information. The first was transactions, filling prescriptions, requesting appointments or

release of information (Aherns et al., 2011). The second was expert care, clinical services including secure messaging, home telehealth, and interactive interventions tailored for the patient (Aherns et al., 2011). The third was self-care and community resources, which primarily offer self-learning and social support (Aherns et al., 2011).

Patients were enthusiastic about secure messaging, but physicians feared the potential of secure messaging to bog physicians down with patient requests (Aherns et al., 2011). Patients also expressed interest in electronic storage and access to health records, remote monitoring, telehealth, health-risk assessments with feedback, and computerized tailored interventions (Aherns et al., 2011). Aherns et al. (2011) also noted a disparity exists between people who have internet access and can reach this information and those who cannot.

Paul and Robinson (2012) found EHR improved patient care decreasing adverse drug interactions. However, EHRs were not perfect. If the drug interaction information entered in the system was not correct or complete, or the software design has flaws, then patients were still vulnerable to error (Paul & Robinson, 2012). Through data sorting of medical records in Australia, Paul, and Robinson (2012) found 2-3% of admissions were because of adverse drug reactions. This statistic increased to 30% for populations 75 years of age or older (Paul & Robinson, 2012). The adverse drug reactions were often the result of inadequate documentation in medical records (Paul & Robinson, 2012). The under-reporting and under-coding of adverse drug reactions were also part of the problem, which was an organizational culture issue. The medical staff was more worried more about admitting to error than improving patient care (Paul & Robinson, 2012).

EHR education. Hammoud et al. (2012) examined the use of EHR systems by medical students by surveying the students on their usage. The study had 346 respondents, which was equal to a 32% response rate (Hammoud et al., 2012). Medical students used EHR at 64% of academic medical centers (Hammoud et al., 2012). This training was vital because these students were America's next generation physicians (Hammoud et al., 2012).

More than half of the teaching hospitals in the United States allowed students to make traditional notes in the EHR (Hammoud et al., 2012). Many educators worried templates would impair the learning process (Hammoud et al., 2012). The results of the study were that the students were not using the templates and tools which were included in EHRs (Hammoud et al., 2012). EHR systems were increasing in popularity as the passage of the American Recovery and Reinvestment Act of 2009 and the Patient Protection and Affordable Care Act (ACA) in 2010 (Hammoud et al., 2012). Ketikidis, Dimitoyiski, Lazuras, and Bath (2012) stated educational programs should include information about how the programs will improve the health care provider's efficacy and competency skills about computer interactions. A concern medical educators were dealing with was limiting EHR access limited student success after graduation (Hammoud et al., 2012).

Baba, Thompson, and Berger (2011) studied the University of North Carolina's health care system. The University of North Carolina had an almost paperless system, and the EHR users believed patient safety had increased (Baba et al., 2011). The university decided for teaching, to print out round reports to present educational

information to the residents (Baba et al., 2011). The report printing increased the paper used by the university but did not slow processes needed for patient care (Baba et al., 2011). The University used the system for one month and then surveyed the residents using the system. Baba et al. received a 25% response rate, which supported the decision to offer a paper system to deliver the information (Baba et al., 2011). The printouts assisted the students in learning without compromising patient care (Baba et al., 2011).

EHR Failures and Successes

Smith and Koppel (2013) stated the goals of an interoperable HIT system were safety, affectivity, and user-friendliness. These goals remained elusive (Smith & Koppel, 2013). The desire to use simple examples, which do not explain the true intricacies of health care was an impediment to attaining these goals (Smith & Koppel, 2013). Smith and Koppel looked at HIT use in real life and found HIT did not always work as designed. Smith and Koppel found a typology of misunderstandings between patient realities, clinician mental models of this realities and representations of this reality within HIT. The researchers used:

- their 20 years of direct observation,
- partners data,
- logs from hospital and clinic IT departments,
- implementation reports,
- user personal communications,
- HIT vendor forums,
- helpdesk logs,

- FDA center for devices and radiological health reports and logs,
- IOM and AMIA task forces on usability,
- AMIA implementation forum,
- additional reports from the field to collect data for the study (Smith & Koppel, 2013).

Smith and Koppel (2013) developed a list of five types of miscommunications among the patient's physical reality, clinician mental models, and HIT.

Type I: too coarse, the language used in IT is too coarse. The patient's reality and the clinician's mental model had distinct scenarios, which affect the clinicians' decisions. The coarse language in the IT loosened the distinctions by mapping the scenarios into same elements (Smith & Koppel, 2013). Type II: too fine. Identical scenarios were represented differently in IT (Smith & Koppel, 2013). Type III: missing reality scenarios or scenario details were missing, and clinicians were unable to make good decisions because of the missing information (Smith & Koppel, 2013). Type IV multiplicity. When different communities of clinicians had constructed different mental models; clinicians enter their interpretation of the situation, not just the facts which led to incorrect diagnosis (Smith & Koppel, 2013). Type V: Looking-glass. A clinician interpretation of a scenario entered into the IT when retrieved, and the scenario became something different and clearly incorrect (Smith & Koppel, 2013). Clinicians rejected the erroneous data in the paper charts but accepted the erroneous data in the HIT (Smith & Koppel, 2013).

Smith and Koppel (2013) discussed the difficulties in getting information on problems with HIT as people want to protect their organizations. Further, Smith and

Koppel (2013) suspected 70% of HIT fail. Different protocols and workflows existed for each system and attempting interoperability created a large potential for misinformation (Smith & Koppel, 2013).

Magrabi, Ong, Runciman, and Coiera (2012) examined the classification of HIT safety problems as reported to the Food and Drug Administration (FDA). The researchers determined only 0.1% of problems reported were because of HIT (Magrabi et al., 2012). Hit systems need to be developed to better meet the needs of clinic workflows to eliminate or reduce human errors (Magrabi et al., 2012).

Colla et al. (2012) examined the Medicare Physician Group Practice Demonstration (PGPD) for the cost saving effects with vulnerable populations eligible for both Medicare and Medicaid (Colla et al., 2012). The PGPDs were the practices first to implement the cost-saving strategies now required for Accountable Care Organizations (Colla et al., 2012). The participants in the PGPD program were 177 physicians and 990 patients (Colla et al., 2012). Colla et al. (2012) found the program created significant savings for the dually eligible patients but were not important for the patients receiving only Medicare. For the entire study population, the savings were an average of \$114 per patient. However, on closer examination, the savings were \$532 per dually enrolled patient and \$59 per only Medicare patient. Colla et al. (2012) concluded the programs had the potential to slow health care spending growth.

Jha, Joynt, Orav, and Epstein (2012) used data from the Center for Medicare and Medicaid Services to examine if using EHR systems has led to lower 30-day mortality rates. This data was from the 421 hospitals, which joined the Premier Health care

Informatics program in 2003. The initial mortality rates were similar at both Premier and non-Premier hospitals, 12.33%, and 12.40%. Jha et al. then looked at the data reported 6 years later; they found no significant difference between the rates in the study groups. However, the rates were higher in the premier hospitals than at the non-premier hospitals. Jha et al. (2012) acknowledged the possibility a small benefit from the pay for performance was missed in the large sample size but added the small benefit probably would not be clinically significant. Jha et al. (2012) stated we still do not know the right mix of incentives for quality improvements measures.

Ryan et al. (2014) investigated the EHR incentives offered by New York City for primary care physicians. The practices which were eligible for the program had to have at least 10% of their patients be uninsured or on Medicaid (Ryan et al., 2014). The program provided an EHR with a clinical decision support system (Ryan et al., 2014). New York City initiated an incentive program to encourage the use of their Health-eHearts program (Ryan et al., 2014). The Health-eHearts program was a system for improving four clinical preventative services specific to heart disease (Ryan et al., 2014). Half of the practices in the Health-eHearts program received incentives of 5% of the physician's annual income (Ryan et al., 2014). For meeting the study criteria, participants were given technical assistance with the program (Ryan et al., 2014).

The providers who received incentives improved in the specific areas the incentives paid the providers for improving in (Ryan et al., 2014). Comparatively, their quality fell in other areas which the providers did not receive incentives for improving (Ryan et al., 2014). Ryan et al. (2014) also found no association between decision support

and quality performance. Technical support use correlated with improved performance on the measures without incentives, but these improvements were at a smaller rate than the incentivized measures (Ryan et al., 2014).

Lanham, Leykum, and McDaniel (2012) studied the different usage levels of EHR in various practices within the same organization. Lanham et al. examined six different practices, three-family practices, and three specialty practices. Lanham et al. found different offices had different communication patterns and those patterns translated into differed EHR use. The cost and quality of health care delivery varied with the differences in EHR use (Lanham et al., 2012).

Physician preference can produce vast differences in EHR documentation (Lanham et al., 2012). Some physicians worked directly with the system, and others relied on nurses, and medical assistants to document the clinical encounter (Lanham et al., 2012). Questions of how standardized should organizations make their EHR systems existed. Should EHR system managers work to minimize differences in EHR systems or should EHR systems accommodate the differences preferred by physicians (Lanham et al., 2012)? Differences made benefiting from the EHR system more difficult as opposed to EHR systems with consistent use in practice (Lanham et al., 2012). Variations in EHR system capabilities and variation in note documentation in EHRs are impediments to broad information exchanges (DesRoches et al., 2013).

For diagnostic support to function properly, health care providers must input the data into the correct fields (Parsons et al., 2012). Health care providers may overlook data recorded elsewhere in the chart such as obesity and active smoking or other chronic

diseases (Parsons et al., 2012). The differing use of EHR created tension regarding quality care, patient satisfaction and meaningful use for the health care organization (Lanham et al., 2012). Future programming developments may solve this issue as natural language processing improves in converting unstructured text (Parsons et al., 2012). To standardize documentation, Parsons et al. recommended, multiple levels of training. With EHR systems in 2012, physicians could document in any field the physicians choose because no mechanisms existed to encourage physicians to document in particular fields of the EHR (Parsons et al., 2012).

Lanham et al. (2012) analyzed data in EHRs at six practices within the same organization looking for seven characteristics, trust, diversity, meaningfulness, heedful inter-relation, respectful interactions, social and task relatedness, and rich and lean communications. Lanham et al. found two of the family practices had less optimal EHR use, and one of the specialty practices had poor EHR use (Lanham et al., 2012). The offices with the best or most homogeneous EHR use had high levels of trust and teamwork for the office (Lanham et al., 2012). Lanham et al. speculated the focus of specialty clinics allows the specialty clinics to achieve homogeneous EHR use more quickly than family practices where health care providers see many different types of ailments.

Fleurant et al. (2011) examined Massachusetts physicians taking part in the states EHR system implementation. Fleurant et al. (2011) found that physicians' ability to generate registries of laboratory results and registries of medications increased with using

the program. Fleurant et al. (2011) found implementing an EHR system community-wide produced improvements in quality, safety, and health care costs.

EHR Transitions

Cresswell et al. (2013) studied the factors for a successful transition to a new HIT system. Cresswell et al. found 10 key considerations for a successful adoption. First, health care organizations must identify the need for find the technology (Cresswell et al., 2013). The health care organization leadership must create a shared vision among the people in the organization. Cresswell et al. (2013) recommended not using terms like improved quality of care and improved efficiency, which are vague terms and do not create a shared vision. The use of detailed and precise language created a better vision (Cresswell et al., 2013).

Horsky et al. (2012) examined the design features of EHR systems, and the process of improving the human to computer interactions. Deficient interface design of EHR systems contributed to: (a) decreased the cognitive performance of health care providers, (b) convoluted medication prescribing, (c) promoted unsafe workarounds, (d) amplified poor responses to medication safety alerts, (e) increased duplicate order errors (Horsky et al., 2012). Proper design of EHR systems has the consistency of design concepts, visual formats, and terminology (Horsky et al., 2012). Designers had to make sure the screen objects were easy to tell apart; increasing visual variance of screen objects reduced errors (Horsky et al., 2012). Menus, lookup tables, and advisory messages created by the decision support interventions, need to contain consistent language for laboratory tests, procedures and order sets (Horsky et al., 2012). Furthermore, consistent

language to facilitate understanding, and proper system use must be in the prompts and instructions (Horsky et al., 2012).

Using consistent design concepts for interoperable systems creates more efficiency, reducing the time needed to learn the system, decreasing mental fatigue and increasing data accuracy (Horsky et al., 2012). To maintain the system, evaluate human responses and stay abreast of current medical recommendations, required continuous monitoring (Horsky et al., 2012).

Second, the health care organization needs to build consensus among the health care providers that the health care organization should transition to the new HIT system (Cresswell et al., 2013). Building consensus created the means to support the realization of a shared vision (Cresswell et al., 2013). Commitment to the transition to a new HIT system required, getting the buy-in from administrative staff, nurses, doctors, and managers (Cresswell et al., 2013).

Third, consider the options available (Cresswell et al., 2013). The next step for the technological system upgrade was to explore the available options to find the system, which would best meet the organization's needs (Cresswell et al., 2013). Cresswell et al. (2013) advised health care administrators should visit other health care organizations to see what has worked for other health care organizations. Is a commercial system best or does the organization need to develop a system, is a question the organization must answer (Cresswell et al., 2013).

Fourth, choose a system, which meets clinical needs and is affordable (Cresswell et al., 2013). Clinical needs should play a role as well as affordability (Cresswell et al., 2013). Seymore et al. (2012) listed four strategies for implementing EHR software:

1. In-house, organizations hire information technology professional to develop an EHR system (Seymore et al., 2012).
2. Purchased off the shelf software package and then customize information technology to the organization's needs (Seymore et al., 2012).
3. 'Best-Of-Breed' approach, which is when organizations choose a combination of components from many vendors (Seymore et al., 2012).

While purchasers of these systems get the best components, the 'Best-Of-Breed' approach may be labor intensive in interfacing the different programs (Seymore et al., 2012).

4. 'Best of Suite' approach; which is when organizations choose the integration of core and interfaces with other software and legacy systems (Seymore et al., 2012).

In a 'Best of Suite,' the systems integrated included human resources, finance and billing, lab information, radiology information, and admissions (Seymore et al., 2012).

Seymore et al. expounded 'Best of Suite' often decreases the cost for the whole system.

Pai and Huang (2011) advocated that systems be designed to prompt the user for correct operation and were easy to learn. Cortelyou-Ward and Yniguez (2011) recommended pretesting the software that was available. Pretesting took more time, but pretesting prevented costly mistakes later (Cortelyou-Ward & Yniguez, 2011).

Goldwater et al. (2013) examined the use of open source EHR systems at community health centers and federally qualified health centers. A misconception about open source EHR systems was open source EHR systems were free. Any modification needed, or training for the use of an EHR system requires contracting an expert, which was a financial cost. Using open source EHR systems can result in significant cost savings and still meet the federal meaningful use requirements. The government should provide more assistance to community health centers, and federally qualified health centers to use the resources available in open source EHR systems (Goldwater et al., 2013).

Schweitzer (2012) explained the possibility of using cloud-based EHR systems. The low upfront cost was an advantage the cloud computing systems had over traditional EHR systems (Schweitzer, 2012). Cloud-based EHR had a monthly fee for the service rather than the upfront costs of owning the entire EHR system (Schweitzer, 2012).

Cloud technology providers offered state of the art security (Schweitzer, 2012). However, the physicians were liable for any HIPAA violations from security failures (Schweitzer, 2012). The best course of action for health care providers was to have the cloud technology provider sign a business associate contract (Schweitzer, 2012). The contract creates shared liability for HIPAA violations between health care providers and the cloud technology providers, so that the cloud technology providers have an incentive to help protect the patient information (Schweitzer, 2012).

Fifth, plan appropriately, both targeted and reflective efforts to plan for transformatively organizational ventures (Cresswell et al., 2013). The process of

transition to a new HIT system required flexibility (Cresswell et al., 2013). Cortelyou-Ward and Yniguez (2011) recommended the use of flexible approaches; adding more rigidity was needed as the project moved toward completion. Cresswell et al. stressed the importance of avoiding scope creep and maintaining open channels of communication. Seymore et al. (2012) recommended using Gantt charts and PERT charts to keep EHR implementation projects within time and budget constraints.

Phased or big-bang implementation was another question managers in the health care organizations needed to answer (Cresswell et al., 2013). Cresswell et al. (2013) recommended avoiding the running of parallel systems. Running parallel systems increased workloads for end-users and increased chances for mistakes, which were threats to patient safety. Identifying and tracking milestones were appropriate and simple to implement (Cortelyou-Ward & Yniguez, 2011).

Sixth, do not forget the infrastructure (Cresswell et al., 2013). Developing the proper infrastructure enabled the system to run properly. Implementation of EHR systems required network and hardware upgrades.

The seventh step, training the staff (Cresswell et al., 2013). Cresswell et al. (2013) noted with training, users were more satisfied with the new technology than those who had no training or inadequate training. Effective training was monumental in overcoming barriers to EHR acceptance (Sykes et al., 2011).

Brooks and Grotz emphasized the importance of training every staff member. Physicians wanted to focus their time on productive tasks, like seeing patients and resisted learning information technology needed to use the new EHR (Brooks & Grotz,

2010). The physicians and the whole system needed to expect a productivity reduction (Brooks & Grotz, 2010). The expectation of a 50% reduction in productivity in the first two to three weeks after the go-live date kept morale up (Brooks & Grotz, 2010). After approximately six weeks, productivity was approximately 75% of what productivity was before the implementation (Brooks & Grotz, 2010). After this period, productivity should slowly climb back to normal levels, as long as no setbacks occur (Brooks & Grotz, 2010).

Point-and-click training sessions, which taught what to do and how to do it were not effective (Sykes et al., 2011). Effective training sessions focused on performance benefits of various features of EHR systems, and discussions of particular teaching case studies (Sykes et al., 2011). Using scenarios of situations, physicians may encounter in their medical practices increased learning and ease of use reported for the system (Sykes et al., 2011).

Productivity loss was the price for gaining better documentation, improved accuracy and safer patient care (Brooks & Grotz, 2010). Brooks and Grotz (2010) estimated a year for some organizations to reach their pre-implementation productivity rates. Predicting the future was difficult; the new EHR system needed to be able to grow with the organization especially in these areas: (a) quality safety and efficiency, (b) engaging patients and their families, (c) care coordination, (d) improving population and public health, (e) ensuring patient privacy (Brooks & Grotz, 2010).

The transition was difficult (Brooks & Grotz, 2010). Participants reported a lag existed in HIT as compared to other industries information technology (Brooks & Grotz, 2010). The requirement of changing a large amount of data from paper to digital for HIT

had created the lag (Books & Grotz, 2010). The best plan was focusing on cost savings activities, not spending less on the initial EHR purchase (Brooks & Grotz, 2010).

McAlearney et al. (2012) examined the underlying sociocultural factors affecting the learning processes and influencing EHR implementation. McAlearney et al. studied six sites with successful EHR system implementation whose management chose the big bang methods to transition to a new EHR system. The researchers were studying the training programs used by these facilities (McAlearney et al., 2012). McAlearney et al. discovered seven key training components for successful transitions to new EHR systems. Obtaining organizational commitment to invest in: (a) training, (b) assessing the user's skill and training needs, (c) selecting appropriate training staff, (d) matching training to users' needs, (e) using multiple training approaches, (f) providing training support throughout implementation, (g) retraining and optimizing the components needed for successful EHR implementation (McAlearney et al., 2012). McAlearney et al. noted the importance of emphasizing the value of outcomes from the change. Health care organizations paid attention to the training process, or the health care organization risked having substandard implementation results (McAlearney et al., 2012).

The researchers found evidence to support three of their five-research propositions (McAlearney et al., 2012). First, training programs, which include observation, and active learning activities lead to better learning outcomes and meaningful use of an EHR system (McAlearney et al., 2012). Second, learners who observed others successfully using the EHR systems gained confidence that the learners could also successfully use the EHR systems (McAlearney et al., 2012). Third, trainers

who used training programs, which include variations in the assumptions and characteristics of the training groups, lead to better learning outcomes and meaningful use of an EHR system (McAlearney et al., 2012).

Eight, continuously evaluate the progress made (Cresswell et al., 2013). Real-time, longitudinal data collection strategies providing formative feedback were desirable as these gave emerging results. Incorporating these emerging results in on-going implementation activity was costly and time-consuming, and the evaluation of results requires additional time (Cresswell et al., 2013). Cresswell et al. (2013) noted gains expected from the new HIT systems could take years to achieve.

Ninth, maintain the system (Cresswell et al., 2013). Systems require periodic maintenance to keep functioning. Servers and computers as well as printers and other peripherals, needed maintenance to provide timely and effective transmissions (Cresswell et al., 2013). Pai and Huang recommended continually improving system Tenth, stay the course (Cresswell et al., 2013). The benefits were difficult to measure and took a long time to materialize (Cresswell et al., 2013).

Abramson et al. (2012) studied physicians transitioning from an older custom-built EHR system to a newer commercial EHR. The physicians felt less efficient well after the transition period and did not believe patient safety had improved (Abramson et al., 2012). The health care organization forced the physicians to make this change and possibly biased their opinions' (Abramson et al., 2012). Abramson et al. (2012) found improved patient safety through e-prescribing; the commercial system prevented inappropriate medication abbreviations (Abramson et al., 2012).

Brooks and Grotz (2010) advocated using common sense when implementing an EHR system. Brooks and Grotz recommend:

1. Be ready to spend a lot.
2. Get health care providers on board with the project.
3. Get expert help.
4. Modify the EHR to meet the organization's needs.
5. Start with a small project first.
6. Training is essential.
7. Expect less productivity.
8. Plan for the future.
9. Manage expectations.
10. Maintain patient privacy.

A Hospital system in Kentucky spent 40 million for the EHR system for their 1000 physicians (Brooks & Grotz, 2010). Another factor in the expense of getting an EHR system was the decreased productivity because of reduced patient appointments scheduled during the beginning of the implementation of an EHR system. Brooks and Grotz (2010) advocated for workload reductions to occur while the implementation begins as this is a high-stress time for organizations.

Having the doctors and nurses, support for the project sets the culture for the organization (Brooks & Grotz, 2010). Friction from providers not knowing the technology can decrease a patient's level of care and satisfaction with the provider and patient experience (Brooks & Grotz, 2010). Pai and Huang (2011) found information

quality supported user acceptance of HIT. Most experts recommend having super users, highly trained staff available to help another staff with the new system was a suggestion of consultants (Brooks & Grotz, 2010).

No one perfect EHR system existed which fit the needs of an organization out of the box (Brooks & Grotz, 2010). Many organizations desired customized EHR systems built to meet their specific requirements (Brooks & Grotz, 2010). Brooks and Grotz (2010) also recommended taking plenty of time. Brooks and Grotz recommended maintaining control of the EHR transition process, even if maintaining control of the EHR transition process meant losing stimulus funds.

Transition and Summary

In Section 1 of the qualitative single case study of how an MHS successfully transitioned an older EHR system to a compliant EHR system, began with an overview with an explanation of what had happened in the health care field and an explanation of this problem. Section 1 contains an account of how legislative changes have accelerated the introduction of technologies into health care providers' offices. The background of the problem section includes information on the rising costs of health care, high error rates because of handwriting and the low rates of EHR usage in the United States.

The nature of the study section includes an explanation of why a qualitative case study was most appropriate for this research. The research and interview questions section focused on the successful transition to the compliant EHR system with the conceptual framework of TAM. The study has clearly defined assumptions, limitations,

and delimitations and has the potential to create positive social change by assisting other MHSs to have a more productive and efficient transition to a new EHR system.

Section 2 begins with an explanation of the exact steps taken for the qualitative case study of the successful transition of an MHS with an older EHR system to a compliant EHR system. This section covers the possible influencing the study. This section also defines who the participants were for the study. Then an explanation of why a qualitative case study was the best option for the research study. Then the section continues with an explanation of the techniques used to address population sampling and ethical research. Following is the section explaining the collection, organization, and analysis of data. Section 2 concludes with an explanation of how the study was reliable and valid.

Section 2: The Project

Purpose Statement

The purpose of the qualitative exploratory single case study was to explore strategies that led to a successful transition from an older EHR system to a compliant EHR system at an MHS. The study included interviews with senior managers who have implemented an EHR system transition within their MHS. The population members live in the Pacific Northwest and have insights into the factors for a successful transition from experience in a health care setting while implementing an EHR system upgrade to meet the federal requirements. Through the review of documents, observations, and semistructured interviews, I explored the strategies involved in the successful transition from an older EHR system to the compliant EHR system. Findings may result in determining a more effective process for the transition from older EHR systems to compliant EHR systems. Results may contribute to social change by identifying strategies related to a successful transition, which may improve medical record portability for hospital and health care provider staff who are going through the same process in the coming years.

Role of the Researcher

My role as a researcher was to minimize the influence of personal biases while conducting the study. Yin (2014) stated the researcher needs to accept results that are contrary to expectations. Notable biases in my study were the belief that EHR was more efficient than paper charts and the belief that change was hard and individuals would resist change.

Conducting interviews in an unbiased manner created an open space for participants to answer questions. I observed tone, mannerisms, and other nonverbal communication expressed by the participants by listening attentively during each interview. Participants could respond to the interview questions about transitioning to the Medicare and Medicaid compliant EHR system, allowing the participants to share their insights and knowledge on the subject.

I previously worked for the MHS, which was the focus of the study. The experience included three job assignments. The first was medical records clerk, working with paper charts before the work area transitioned to an EHR system. The second was an administrative assistant for the informatics department during the planning stage of the transition from an older EHR system to the Medicare and Medicaid compliant EHR system. The third was as an end user of the new system during the first hospital's go-live period. My close relationship to the study site possibly resulted in additional bias in the study.

Another requirement for conducting the research study was doing the research in an ethical way. DuBois et al. (2012) discussed the ethical research and the Belmont Report. The Belmont Report stated researchers must not harm participants and must present possible risks and benefits of participating in the study, so participants can decide if they would like to participate, and must not take advantage of vulnerable populations (DuBois et al., 2012). Vulnerable groups include pregnant women, fetuses, neonates, prisoners, and children (DuBois et al., 2012). The participants of the study were not in a vulnerable group. Participants gave permission for interviews with informed consent, and

I had no social or political power to compel their participation. DuBois et al. cautioned against labeling groups as vulnerable as this practice reinforces stereotypes and stigmas. DuBois et al. advocated for promoting the value of individuals and considering the ethical value of the research during the development of the research methods.

Participants

The qualitative case study of an MHS in the Pacific Northwest with purposeful sampling allowed for a smaller sample population. Marshall and Rossman (2016) conveyed in a qualitative study, the ideal sample size is the sample size most appropriate for the purpose of the research. A single information-rich interview can be the case for a case study. To ensure data saturation, I interviewed 12 English-speaking managers who participated in the transition of an MHS's EHR system to a compliant EHR system.

All participants had experiential knowledge of the process of transitioning to a compliant EHR system from an older EHR system. Palinkas et al. (2013) recommended purposeful sampling as the best practice for researchers conducting qualitative case studies. Marshall and Rossman (2016) explained purposeful sampling is critical for a good case study by facilitating comparisons among groups. In purposeful sampling, researchers choose particular cases for theoretical reasons (Petty, Thomson, & Stew, 2012). I rejected random sampling because it allows for the interchangeability of cases. Additionally, random sampling adds credibility when the purposeful sample is too large, but the sample was not too large with this study (Marshall & Rossman, 2016). Qualitative researchers use purposeful sampling to interview knowledgeable and experienced

individuals who can share their experiences by articulating with rich detail, and reflection (Palinkas et al., 2013).

Participants used one of two methods to give informed consent. The first method was by email through replying to the email with the words “I consent.” The second method was by an ink signature on a printed informed consent form. Participants needed to submit only one consent form.

Potential participants received, by email, an informed consent form to review and digitally sign. If participants did not consent by email, I provided them with a printed copy of the consent form to sign. Participants were permitted to take a printed copy of the consent form to keep for their records if desired. Participants who chose a telephone interview could print the consent form from the email if they desired a printed copy. Prospective participants decided if they wanted to participate in the study based on the information provided in the consent form.

Pan and Tan (2011) explained that in case study research, the researcher answers the explanatory questions such as how and why. Watkins (2012) noted the qualitative researcher describes the complexity of the occurrences and collects data using open-ended questions and observations. I made efforts to create an open dialog with the participants, by using open-ended questions and follow-up questions and by listening actively while participants shared their insights on the topic of EHR system transitions (Marshall & Rossman, 2016).

Research Method and Design

Method

The research question was the following: What do health care administrators need for a successful transition from an older EHR system to a fully integrated EHR system at an MHS? The descriptive and interpretive exploration warranted a qualitative approach (Denzin & Lincoln, 2011). Marshall and Rossman (2016) recommended a qualitative research design for management and health policy research. Information that is atypical, unusual, vital, or extraordinary in some way falls within the purview of qualitative research (Booth, Carroll, Ilott, Low, & Cooper, 2013).

The use of a qualitative approach to explore how health care systems could best transition to a compliant EHR system was appropriate for the study of business and management practice. McMahon, Watson, and Bimrose (2012) used a qualitative method to explore career transition and adaptability in older women. Sinnott, Guinane, Whelton, and Byrne (2013) used a qualitative method to explore whether 50-cent co-pays were optimal in Ireland. Alshawi, Missi, and Irani (2011) used a qualitative approach to study customer relationship management adoption by small and medium-size enterprises.

A quantitative approach was not appropriate because the research questions called for inductive answers that were about relationships (Knight & Cross, 2012). Additionally, the quantitative approach is suited for studies that involve numerical or deductive answers (Knight & Cross, 2012). Coates (2011) explained quantitative research requires hypotheses, exact measurements, replicability, and control. Leech, Collins, Jiao, and Onwuegbuzie (2011) noted the quantitative approach includes statistical analysis, which

requires numerical data; however, the qualitative approach uses thematic analysis.

Further, the mixed-methods approach requires both numerical and qualitative data (Leech et al., 2011); therefore, the mixed-methods approach was not appropriate for the study.

Research Design

The use of the case study design to explore how an MHS successfully transitions from an older EHR system to a compliant EHR system was appropriate because the study addressed a specific phenomenon. Crowe et al. (2011) asserted case studies were useful when researchers need to find in-depth understanding of the phenomenon, issue, or event in its natural situation. Case studies can offer additional insight when gaps exist in the literature, and case studies answer how, what, and why questions (Crowe et al., 2011). Yin (2014) explained case studies are a contemporary way to explore and examine the phenomenon descriptively.

The case study was appropriate for operation management research (Barratt, Choi, & Li, 2011). Petty et al. (2012) found case study research is imperative for theory development. The how and why questions are suitable for case study research as these questions are exploratory (Yin, 2014). Data collected on the singular, such as a small sample, a single case, a social entity, or a situation is the focus of case studies (Petty et al., 2012). In a multiple case study design, each case must be able to stand-alone (Yin, 2014). Scheffer, Tausche, and Edelhäuser (2011) used a survey method to study patient-oriented medicine because survey-based methods have stronger guidelines than case studies. Scheffer et al. (2011) noted case studies permit more flexibility than a survey method. Case research is dependent on the researcher and the relationship between data

collection and theory (Unluer, 2012). Petty et al. (2012) explained the case study design is for exploring detail-rich descriptions of current complex issues. Therefore, I chose a case study design to explore how an MHS successfully transitioned from an older EHR system to a new interoperable EHR system.

The other qualitative research designs did not support the detail-rich case exploration of the study. Researchers use a grounded theory design to understand social patterns and fundamental structures and use specific techniques to generate new grounded theory (Petty et al., 2012; Watkins, 2012). Grounded theory was not suitable for exploring a single case in considerable detail. A phenomenological design permits data collection only from interviews (Marshall & Rossman, 2016). A phenomenological design would exclude the data gathered from public documents, which was part of data collection for the study. Ethnographic designs are suitable for examining the beliefs and behaviors of groups from within a culture (Marshall & Rossman, 2016). Beliefs and behaviors of groups within a culture were not the focus of the study on how an MHS successfully transitioned from an older EHR system to a new interoperable EHR system.

Population and Sampling

This qualitative case study focused on the exploration of manager perspectives about the factors leading to the successful transition of MHS from an older EHR system to a compliant EHR system. The study sample population included managers from an MHS involved in the decision, planning, and execution of the transition to the compliant EHR system in the Pacific Northwest. Participants selected on a methodical basis included managers at an MHS in the Pacific Northwest.

Individuals in management positions in the MHS transitioning from an older EHR system to a compliant EHR system in the Pacific Northwest composed the sample population. The objective of the study was the collection of data from documents and participants with explicit knowledge of decisions involving the transition from an older EHR system to the new interoperable EHR system. To recruit participants with germane experience and knowledge, I used purposeful sampling.

To diversify the sample population, I used maximum variation sampling to identify and recruit the health care managers as study participants. Maximum variation sampling consists of the choice of a wide range of participants to obtain the full variation of perspectives about the phenomenon of interest to create immense diversity for comparison (Marshall & Rossman, 2016). The use of maximum variation sampling in collected data facilitates identification of common patterns (Marshall & Rossman, 2016). Wyatt, Brand, Ashby-Pepper, Abraham, and Fleming (2015) used maximum variation sampling in their study of healthy workplaces. Additionally, Gikas and Grant (2013) used maximum variation sampling in their study of the importance of mobile devices for students at four-year universities.

Through snowball sampling, participants assisted in identifying and recruiting additional study participants (Baltar & Brunet, 2012; Petty et al., 2012). Snowball sampling consists of researchers relying on participants' previously established relationships, for identification of participants within difficult to recruit populations (Arnold et al., 2012). Trotter (2012) explained snowball sampling is a technique that builds from convenience sampling to reach elusive participants.

I determined an appropriate sample size for the study of the successful transitioning of an MHS from an older EHR to a compliant EHR system from consideration of the number of participant hospital sites and the desired number of participants from each site. Rubin and Rubin (2012) explained the number of sites selected for a qualitative study is dependent on the research questions and the factors, which might influence the studied phenomenon. A large number of interviews is inessential in creating thoroughness in a qualitative study (Rubin & Rubin, 2012). To achieve acceptable depth and diversity of perspectives, a minimum of two to three interviews per site is sufficient (Rubin & Rubin, 2012). Accordingly, with the five sites included in the study (the five hospitals of the MHS) and a range of two to four interviews per site, I determined a minimum sample size of 12 to 15 interviewees was appropriate.

I achieved saturation and diversity of perspectives and insights with 12 interviews, which included three interviews with no new ideas or themes emerging. Additionally, each site had a minimum of two participants. Griffith (2013) noted the sample size is important for qualitative studies for demonstrating transferability and discovery. Researchers using purposeful sampling in qualitative research can use small sample sizes, even as small as one (Griffith, 2013). Trotter (2012) explained qualitative research has specific parameters for small, consensus-oriented sample populations. O'Reilly and Parker (2013) noted complying with an established range of the sample population is not always relevant for qualitative studies. Population sample size should be large enough for generalization, but not so large as to be overly repetitious in data

collected (O'Reilly & Parker, 2013). By considering the purpose of the study and the diversity of perspectives given by participants, qualitative researchers determine the sample size (Trotter, 2012).

In interview research, sufficiency and saturation are the main criteria for determining the adequate sample size (Rubin & Rubin, 2012). Reaching data saturation, when no more patterns emerge, and few to no surprises exist in the data (Kerr et al., 2010; O'Reilly & Parker, 2013). Walker (2012) noted the steps are unclear for reaching data saturation in qualitative studies, but Walker stressed the importance of reaching data saturation. Achieving thoroughness by conducting enough interviews to illustrate suitable depth and diversity of perspective (Rubin & Rubin, 2012). Rubin and Rubin (2012) recommended conducting two to three interviews per site to achieve saturation. Conducting 12 to 15 interviews among the five MHS locations meets this recommendation.

I identified and recruited with purposeful sampling, 12 interview participants to achieve suitable depth and diversity of perspective. Purposeful sampling warranted choosing a sample by the samples capacity to offer data relevant to the topic (Kisely & Kendall, 2011). The specificity of qualitative research, regarding the location and other parameters, produces smaller populations and a resulting smaller sample size (Trotter, 2012). Trotter (2012) noted qualitative researchers cease collecting data when saturation is attained, reducing redundant interviews.

The number of participants needed to explore the subject matter of the research adequately determines the sample size (O'Reilly & Parker, 2013). Trotter (2012)

explained the ideal standard for sample size was the amount required to reach saturation. Saturation defined as a number of different interviews lacking the development of new themes (Trotter, 2012). A sample pool of 12 participants, with a minimum of three interviews producing no new ideas or perspectives provided by the participants, signified saturation with purposeful sampling for the study.

Ethical Research

Conducting ethical research was crucial, and I used every applicable precaution. The risk involved in participating in the study on the successful transition of an MHS's from an older EHR system to a compliant EHR system was minimal. The risk involved in participation was the same as what the participants experienced in their everyday lives. Participants may have experienced minor discomfort or fatigue from the discussion of possibly sensitive topics. The level of discomfort anticipated for participants was minimal.

Walden University's Institutional Review Board (IRB) established a process for students to follow in conducting ethical research. Following this process, I completed the National Institutes of Health (NIH) web-based training course for the protection of human subjects while conducting research. The data collected for the study was about the EHR system. Additionally, interviews for the study were only with competent adults over 18 years of age. The IRB approval number was 11-02-15-0309878.

I provided participants with informed consent forms by email and information about the research study, before conducting interviews. Once the participants reviewed the study information, participants signed an informed consent with a digital or physical

signature. Study participants did not receive any incentives. Withdrawal from the study was possible for participants by sending an email at any time during the study period. No consequences existed for participants deciding to withdraw from the study. Data exclusion and destruction occurred, for any data obtained from a withdrawn participant at the time of their withdrawal.

De-identification of participants during the data analysis process protected the privacy of study participants and the MHS. Each participant received a number for designation. I tracked the designation so participants could opt out of the study. Participants only answered questions, which they felt comfortable answering. Participant passed on any questions they did not want to answer.

A secure and safe location stores the data gathered to protect the privacy and rights of the participants for 5 years. A locked file cabinet holds the hard copies and the backup file of the study and analysis. The original electronic copies were on a password-protected computer.

Data Collection

Instruments

Face-to-face interviews and document review were the collection techniques for the data for the study. I was the instrument for the 12 interviews of MHS managers in the qualitative research study (Marshall & Rossman, 2016). Case study data was collected through interviewing participants, examining documentation, and observations of the participants in a work setting (Marshall & Rossman, 2016). Onwuegbuzie and Byers

(2014) noted the importance of documenting the non-verbal communication during an interview.

Yin (2014) explained using data triangulation, collecting data from multiple sources to confirm the phenomena observed, helps to establish credibility. Multiple researchers, data sources, theories, and methods acquiring the same information are ways of achieving triangulation (Trotter, 2012). The use of multiple sources of information allowed me to triangulate the data and build credibility (Trotter, 2012). Qualitative researchers use multiple sources of data to gain in-depth understandings of the phenomena which he or she studied (Hyett et al., 2014). Triangulation creates a vigorous validation for the study findings, creating both qualitative reliability and qualitative replicability (Trotter, 2012).

Standard case study protocols include the use of semistructured face-to-face interviews (Yin, 2014). Bekhet and Zausniewski (2012) used triangulation in their quantitative study on the effects of moving on older populations. Triangulation is using more than one data collection technique to strengthen the study (Bekhet & Zausniewski, 2012). Additionally, Whitney, Currin, Murray, and Treasure (2012) used triangulation in their qualitative study of family interventions for anorexia nervosa. Whitney et al. (2012) stated triangulation builds reliability for the findings in a qualitative study.

Data Collection Technique

I collected data for the qualitative single case study through reviewing documents and information from interviews. Yin (2014) noted researchers could use letters, electronic communications, written reports, newspaper articles, and administrative

documents in conducting case studies. Abramson et al. (2011) conducted reviews of electronic prescribing data at 12 weeks post-implementation and one-year post-implementation. Chapman, Lehmann, Donohue, and Aucott (2012) reviewed computerized provider order entry to study their impact on admissions workflow in neonatal intensive care units. A review of publicly available documents provided information supporting the exploration of how to successfully transition from an older EHR system to a new interoperable EHR system at an MHS.

Rubin and Rubin (2012) stipulated the use of semistructured interviews enable investigators to keep interviews targeted toward subjects relevant to the study research question. Semistructured interviews allowed for the exploration and description of how the MHS in the Pacific Northwest successfully transitioned from an older EHR system to a compliant EHR system. Semistructured interviews allowed for in-depth coverage of an issue, especially if the topic is a personal issue (Sinnott et al., 2013). Abramson et al. (2012) employed semistructured interviews of physicians to explore their experience transitioning from an older and newer EHR system for electronic prescribing. McAlearney et al. (2012) used semistructured interviews to determine how cognitive and learning theories support successful EHR system implementation training.

Telephone interviews allow participants to have greater control of their time and environment (Saura & Balsas, 2014). Telephone interviews are a normal social interaction and an alternative to face-to-face interviews (Saura & Balsas, 2014). James (2015) determined telephone interviews were an appropriate alternative for accessing hard-to-reach participants. Irvine, Drew, and Sainsbury (2013) stipulated using telephone

interviews is not uncommon in qualitative studies. When face-to-face interviews were not possible, I conducted telephone interviews. Saura and Balsas (2014) stated telephone interviewers lose visual cues, gestures, and facial expressions, but interviewers experienced increased hearing of voice, silence, speech rhythm, laughter, whispers, breaths, and sighs.

Study participants gave permission for recording the interview at the start of each interview. Storage of interview recordings was a security code protected tablet device. Storage of transcripts was a password-protected computer. Participants received the opportunity to review a member-check summary for accuracy before data analysis.

Data Organization Techniques

Organization of interview data was by date of the interview and with a letter assignment if more than one interview occurs in a calendar day. Storage of transcribed reports in computer files on a password-protected computer. Storage of written notes occurs in a locked file drawer for a five-year period.

Data destruction occurred at the end of 5 years. Deletion of electronic data happened 5 years post-study completion. Shredding of paper copies and notes occurred at the end of 5 years.

Data Analysis Technique

I created interview questions to aid the exploration of the central research question, which governed the conduct of the qualitative case study. The central research question was what do health care administrators need for a successful transition from an older EHR system to a fully integrated EHR system at an MHS? The use of open-ended

questions supported the creation of a space where study participants could share their thoughts, experiences, and perspectives about the best way health care system transitioned to a new interoperable EHR system. Participants in the study gave responses to the following questions:

1. What perceived ease of use (PEOU) considerations were factors for the decision on which HIT to purchase?
2. What perceived usefulness (PU) considerations were factors for the decision on which HIT to purchase?
3. What PEOU considerations facilitated the transition to the interoperable EHR system?
4. What PEOU considerations impeded the transition to the interoperable EHR system?
5. What PU considerations facilitated the transition to the interoperable EHR system?
6. What PU considerations impeded the transition to the interoperable EHR system?
7. How was training an influence on the successful transition from an older EHR to a compliant system in terms of PEOU?
8. How was training an influence on the successful transition from an older EHR to a compliant system in terms of PU?

A review of the thoughts, experiences, and perspectives shared by the study participants about what do health care administrators need for a successful transition from

an older EHR system to a fully integrated EHR system at an MHS? Data analyzed for the study included observational notes, interview transcripts, and public documents. Further, I guided the collection and analysis of the study data with the conceptual framework of TAM.

TAM, as described by Davis (1993) was a model for technology adoption. With TAM, Davis explained how PU and PEOU increased acceptance of new technology (Davis 1993). TAM is important for decision makers to consider when purchasing new information technology because if the end users do not accept the new information technology the technology rejection costs a business in morale, efficiency, and productivity. TAM provides a framework for researchers to undertake system-wide investigations of complex phenomena. I conducted interviews and reviewed documents to collect data for the study on the successful transition of an MHS from an older EHR system to a new interoperable EHR system, using this framework.

There are two types of coding, inductive and deductive coding (Denzin & Lincoln, 2011). Coding allows qualitative researchers a mechanism to categorize and describe collected data (Watkins, 2012). The categorization and organization of the collected data are by themes (Marshall & Rossman, 2016). The themes are like containers to sort the data into (Marshall & Rossman, 2016). I used Atlas TI to aid the process of coding and creating themes. These themes helped to explore the successful transition of an MHS from an older EHR system to a new interoperable EHR system.

Reliability and Validity

Qualitative researchers establish the dependability, through using case study protocols and case study databases (Barratt et al., 2011; Frels, Sharma, Onwuegbuzie, Leech, & Stark, 2011; Yin, 2014). Marshall and Rossman (2016) and Petty et al. (2012) urged researchers to use member-checks for dependability. Yin (2014) stated member-checking ensures a study has dependability. Dependability is how the researcher plans to react to changing conditions (Marshall & Rossman, 2016). Providing a synopsis of the interview for the participant to review was the processes of member-checking (Marshall & Rossman, 2016).

At the end of the interviews, member-checking appointments were scheduled with each participant. The 12 study participants separately reviewed a synopsis of their individual answers for each question and offered their opinion as to the accuracy of the data interpretation. Of the participants, 10 were able to recognize the interpretations as their own; two study participants offered clarification to their synopsis during the member-check meetings. I adjusted the synopsis to a form the participants agreed were their opinions.

Credibility and transferability are the measures ensured in quality qualitative studies (Denzin & Lincoln 2011; Marshall & Rossman, 2016). Transferability is how the findings could be applied to other populations or context (Petty et al., 2012). In a qualitative single case study, specifying the exact steps taken for data collection and data analysis creates study transferability (Marshall & Rossman, 2016). Researchers provide transparency by addressing any changes which occur in the research process (Petty et al.,

2012). Creating an audit trail, in a straightforward manner enables readers to follow the logic of the decision for a change (Petty et al., 2012). Gerring (2011) noted methodological transparency is as important as statistical significance in developing the collective knowledge in the field of research. Marshall and Rossman (2016) stated keeping a journal of decisions made during the data collection process was a good practice. A data collection journal allows other researchers to review data collection decisions leading to transferability.

Using triangulation, comparing multiple sources of qualitative data is a way to ensure rigor in a case study research (Petty et al., 2012; Scheffer et al., 2011; Yin, 2014). Credibility is the degree to which the findings are trustworthy and believable, which is accomplished through, triangulation (Petty et al., 2012). Marshall and Rossman (2016) suggested researchers to use triangulation to achieve credibility. Baltar and Brunet (2012), stated a case study design in which the researchers apply triangulation adds credibility and validity.

Confirmability is similar to quantitative research's objectivity (Marshall & Rossman, 2016). Qualitative research accepts that the universe is constantly changing; hence, the next study performed will not get the same responses from the participants (Marshall & Rossman, 2016). However, taking into account the changes over time, qualitative research gives dependable results (Marshall & Rossman, 2016). A study is replicable when a different researcher can achieve the same result (Gerring, 2011; Yin 2014).

Reaching data saturation, when the key issues presented from interviews such as concerns or main ideas repeat and no new information appears (Hodges, 2011). Palinkas et al. (2013) explained purposeful sampling is effective for small populations of especially knowledgeable or experienced individuals to achieve sufficiency and saturation for the study. Kerr et al. (2010) recommended testing for saturation throughout the interview process rather than choosing a specific number of interviews to conduct.

Qualitative researchers strive to ensure credibility (Marshall & Rossman, 2016). Additionally, transferability and credibility improve with reporting sampling procedures (Marshall & Rossman, 2016). To ensure credibility and transferability, I: (a) allowed adequate time for interviews and analysis, (b) used member-checks, (c) created a journal of decisions made during data collection, and (d) used triangulation. The final case study includes complete descriptions of any changes to the plan if changes occurred.

Transition and Summary

Section 2 contained an explanation of the purpose of the study and the role of the researcher. The next subsection had an explanation of who the participants of the study are. This section included a description of the population, sampling methods employed, the sample size, confidentiality, and consent measures afforded to the participants. The previous section included an explanation of the choice of using an exploratory qualitative single case study method for the study of what do health care administrators need for a successful transition from an older EHR system to a fully integrated EHR system at an MHS? The next subsection contained information on how the study meets ethical research standards. I also explained the data collection methods planned for use. Data

collection techniques included an explanation of how the researcher was the instrument for the qualitative case study. The next subsection data organization techniques. The last two subsections included descriptions of data analysis, including interview questions, the use of the tool Atlas.ti; and establishing reliability and validity.

Section 3 begins with the description of the findings of the study. Section 3 covered the application to professional practice and implication for social change. The final three sections are recommendations for action, recommendations for further study, and reflections.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this qualitative single case study was to explore the strategies that hospital managers used to successfully transition to a new EHR system at a multisite hospital system in the Pacific Northwest. The data came from member-checked manager interviews, interview observations, and publicly available document review. The findings of this study were congruent with TAM, allowing for the mandatory use of the system.

Presentation of the Findings

The overarching research question for the qualitative case study was the following: What strategies do health care administrators use for a successful upgrade to a compliant EHR system at an MHS? The themes included a hybrid implementation strategy, training strategy, and Social Pressure Strategy, as shown in Figure 1.



Figure 1. Three major themes discovered in this study.

Data analysis software allowed me to create the word cloud shown in Figure 2.

The word cloud illustrates the frequency of word usage from member-checked documents. The word cloud supports the identification of the three themes.

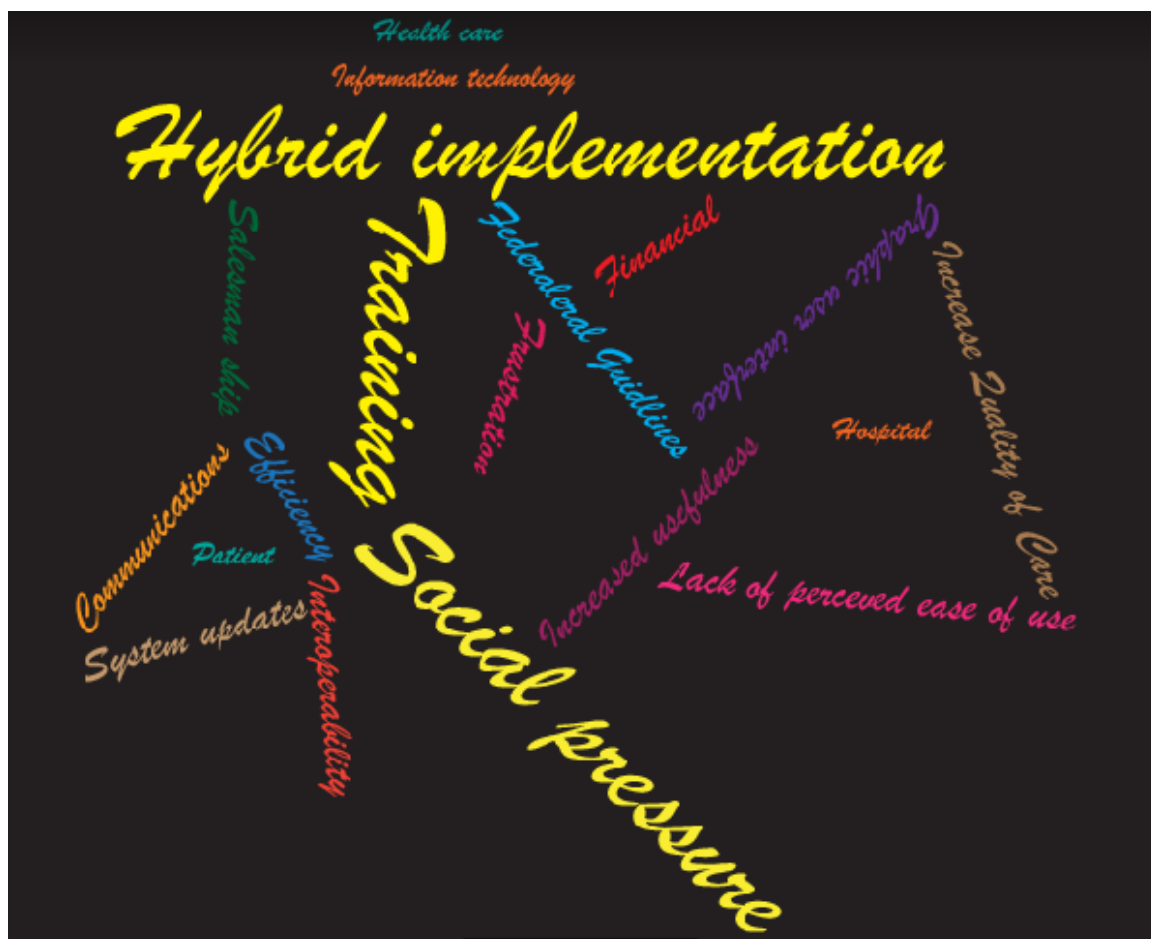


Figure 2. Word cloud supporting theme identification.

Theme 1: Hybrid Implementation Strategy

The MHS used a hybrid big bang and phased implementation strategy to introduce the new EHR system. The MHS achieved the hybrid implementation by having multiple big bangs. The first hospital had its big bang. Then 2 months later the second hospital had its big bang and so on until five hospitals had transitioned. The 12

participants acknowledged the multiple big bang implementation used to transition to the new EHR. The publicly available documents also contained notations of the use of the hybrid implementation system. Cresswell et al. (2013) recommended avoiding parallel systems, and instead using the big bang implementation. Pairin, Lee, and Hong (2014) found smaller organizations were more likely to choose the big bang implementation over the options of a slower phased or parallel implementation. Running parallel systems tended to increase workloads for end-users and increased chances for mistakes, which are threats to patient safety (Creswell et al., 2013). Smaller organizations lack the necessary resources to operate multiple systems simultaneously. Figure 3 shows the codes used in identifying Theme 1.

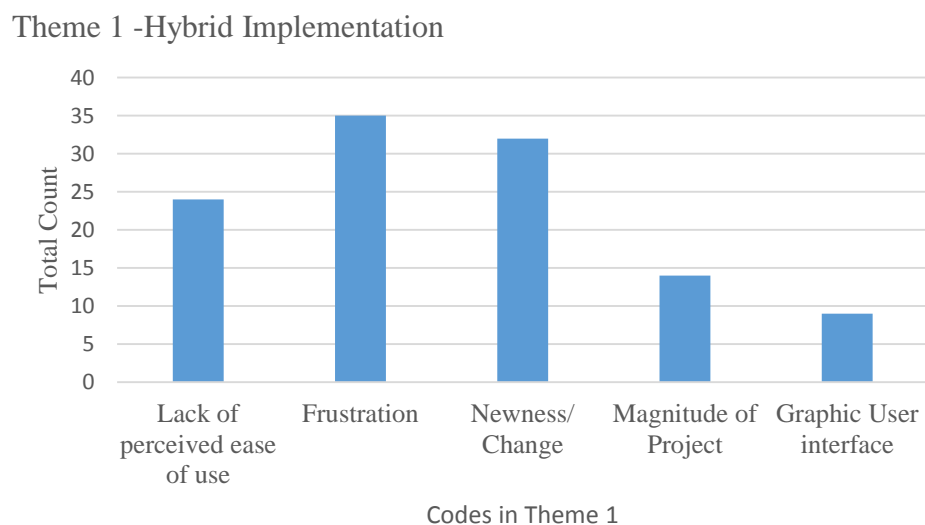


Figure 3. Codes for Theme 1.

The hybrid implementation was the most common theme from the interviews. The codes within this theme were lack of perceived ease of use, frustration, newness/ change, and magnitude of the project. From interview summaries, 105 member-checked

statements received these codes. Moores (2012) found compatibility with workflow was an additional description for PEOU. Low compatibility leads to low levels of use, the feeling of frustration, and the potential for aggressive resistance. As with the system studied for this research, the system Moores studied mandated use, which negated the significance of the level of use for determining intention to use, PU or PEOU. Participant 2 shared that the HIT company recommended changing workflows to accommodate the software rather than changing the software to match the established workflow. Davis et al. (1989) noted the more computer literate the population, the less important PEOU became.

Kim et al. (2016) confirmed this finding; moreover, they found PEOU was not a significant predictor of user acceptance. This finding does support TAM; it illustrates that in work situations with mandatory use, PEOU was less important. Davis (1993) found PEOU to be less important as a factor in user acceptance than PU. Furthermore, Sezgin and Özkan-Yıldırım (2015) found PEOU was a factor in pharmacist acceptance of a pharmaceutical service system, but that it was statistically lower in its significance than PU.

Pairin et al. (2014) noted larger organizations see more return on investment from new system implementations than smaller organizations. Pairin et al. indicated the designers of the system focused on the needs of the larger organizations instead of the needs of smaller organizations. Increased return on investment would add to PU and lead to higher adoption rates, achievable through hybrid implementation strategy.

Theme 2: Training Strategy

Training was the second theme and had considerable occurrences in the member-checked summaries. The MHS had mandatory training classes for jobs, which would use the new EHR system as well as 4 hours of optional paid training time available to employees in computer labs. Hsiao and Chen (2016) attributed social influence and organizational support as critical factors for HIT acceptance. Hsiao and Chen defined organizational support as time, money, and human resources; a large portion of which was training. Participant 6 commented that computer labs were available for people to train with pay for 4 hours per week. The codes for Theme 2 are illustrated in Figure 4.

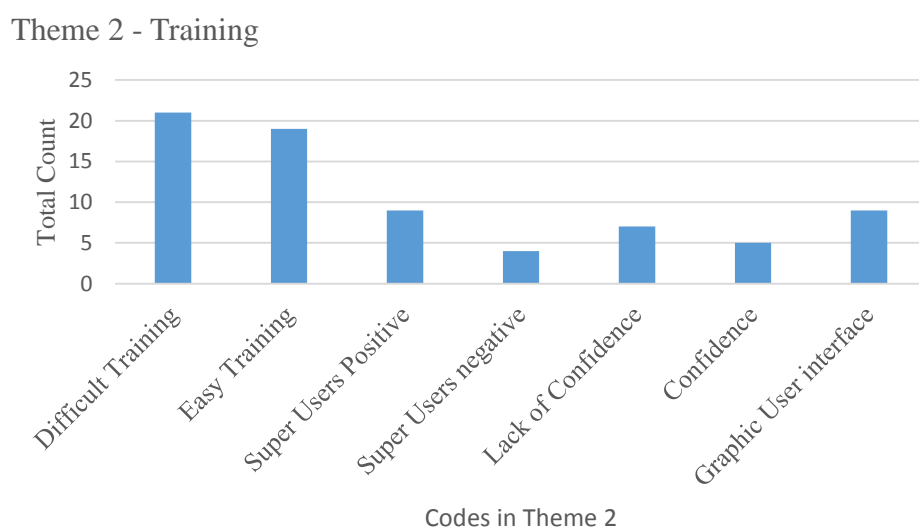


Figure 4. Codes for Theme 2.

Davis et al. (1989) looked at training with University of Michigan MBA students and found 1 hour of training significantly increased PU over the MBA students who did not receive 1 hour of training for using the word processing program. Participants from the earlier sites perceived the training and super users to be less effective than the

participants from the sites that transitioned later. This finding is supported by Davis et al. (1989), they explained during program development, in the early phases it is difficult to explain to users in a meaningful way what a proposed information technology will be like. After having an actual go live, the trainers and super users knew the outcome of the newly designed HIT. Participant 10 explained how his site “worked with the informatics team to set up scenarios with role-playing for after-hours training, after attending the classroom training. This hands-on experience is what helped the most for learning to use the system.” This site used the paid time available to the staff for each week as a meaningful, practice.

The satisfaction with the training and super users increased as more sites had experienced their big bangs. Participant 1, who was from the last hospital to transition, stated “the super user training was the largest factor facilitating the transition. The amount of training given to employees and the manuals made learning the system easy.” In contrast, Participant 12, who was from the first hospital to transition reported “the training was very introductory for the EHR system, not job specific enough for staff to be able to do their jobs with the new system.” She concluded “most things were learned at go live just getting in and doing it.” Further, Participant 7 was from the second hospital to transition, and she reported “I think the training was terrible. I have several areas of nursing that I function in, and because of this I ended up getting more extensive training than the super users had, which does not seem right.”

Theme 3: Social Pressure Strategy

The third theme found was social pressure. The codes within this theme were efficiency/increased usefulness, interoperability, increased quality of care, and communication; furthermore. In the interview summaries, 91 member-checked statements received these codes. The leadership consistently released messages to the organization stating that the new system would increase efficiency through interoperability and increased quality of care for patients. It is possible to overcome resistance when key stakeholders have a central role in the decision-making process (Moore 2012). According to the second publicly available document reviewed, “the benefits to patients are so significant that this became a logical step for the organization.” Participant 6 noted super users received training on how to be upbeat and show the usefulness of the system. Participant 6 reported answering questions with statements such as “when you do your charting here you can see it over here, and that is really going to help you because now you are not going to have to do this because that is already there.” Figure 5 illustrates the codes used to identify Theme 3.

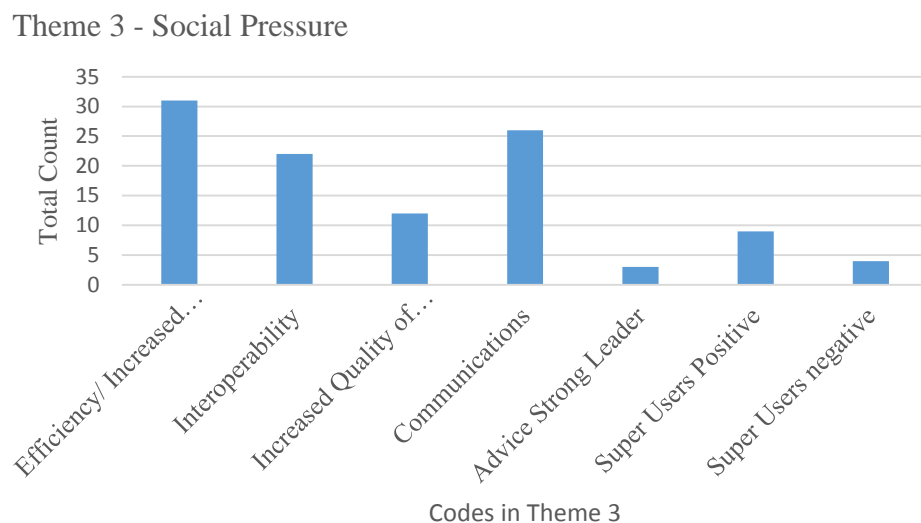


Figure 5. Codes for theme 3.

The organization's leadership used social pressure to increase PU, which led to increased technology acceptance. Hsiao and Chen (2016) attributed social influence and organizational support as critical factors for HIT acceptance. In a study of general managers and chief operating officers' acceptance of social media, Kim et al. (2016) found PU and perceived enjoyment as significant predictors of user acceptance. Kim et al. confirmed the finding and TAM that PU increases technology acceptance. Sezgin and Özkan-Yıldırım (2015) also found PU had the strongest effect on user acceptance in their study of Turkish pharmacists using a pharmaceutical service system. Further, Sezgin and Özkan-Yıldırım (2015) confirmed my finding and TAM that PU increases technology acceptance.

Participant 10 reported the system's "ability to enter and retrieve a large amount of data, keeping patient information secure, risk aversion, [and] ability to easily meet insurance payment criteria" as the reasons for adopting this system. Publicly available

documents contained statements indicating “excitement for the ability to offer our patients digital access to their health information,” and one hospital CEO reported “the change was made to keep in step with the way health care is moving. The old system worked fine, but our hospital now will have a broader network that is the same as many other hospitals around the state.” Participant 3 expressed, “the plan was that the one program would replace the three programs that were being used previously.” Participant 6 said “the fact that the system was being used by lots of other facilities was a usefulness factor that weighed heavy in our decision because it brings with it the access to patient records from other sites. There was also the functionality for doctors and nurses not only to chart on a patient but also to get information to other people about patients to meet their health care needs.” Participant 2 said “really focus on the wins of the system. What does it do better than the previous way?” The 12 participants repeated variations of these sentiments as the reasons for changing to the new program.

Hsiao and Chen (2016) found physicians’ intentions to use HIT systems have four critical factors. The factors are PEOU, attitude toward using computer systems, social influence and organizational support (Hsiao & Chen, 2016). Hsiao and Chen recommended having super users trained in educating staff members about the HIT benefits and the improved quality of medical decision support, job performance, and monetary savings; support from colleagues and supervisors increased physicians’ intentions to use HIT. While Hsiao and Chen, dubbed the term social influence, it is the same concept as social pressure strategy and confirms the findings of this study.

Applications to Professional Practice

Hsiao and Chen (2016) proposed strategy choices made by managers affect user participation or adoption. Increased user participation or acceptance of HIT led to improved quality of care at affordable costs. The participants provided advice and recommendations for ways to improve the transition to a new EHR system for other health care managers. Table 1 lists what participants thought would assist in facilitating the transition to new interoperable EHR systems.

Table 1.

Measures for Improving EHR Transitions

Advice	Narrative
Ask other organizations regarding their experiences	Before you decide on which HIT to purchase talk to people who have purchased it and to people who decided not to purchase it. Find out the whys for those decisions. Once you have decided which system to purchase, reach out to people to other organizations that have done the transition to learn from their experience.
Have Strong Leader(s)	This is an operational project that happens to have a large IT and informatics component to it. The leaders must find ways to break down the system and rebuild it while continuing to provide patient care.
Emphasize Interoperability and quality of care	Having access to patients' charts with the records from other providers and the increase in quality care you can provide makes the change worthwhile.
Increased communication	Identify issues early and build a plan to fix them even if it has to be a few months away, communicating that you know it is not the best, and you are working to improve it helps keep morale up during the process. Don't dictate to smaller facilities to make everyone feel like his or her side is just as important as the other sites.
Give as much training as possible	Having a well-trained tech support makes a huge difference it is much easier, and they will be needed even a year after go-live. The more super users who are well trained and are accessible to everyone the better. Cross training is needed as jobs are rarely just one part of the system, the more all staff know of the system, the better. Train your IT help desk on Epic. We did not do this, so all of the phone call questions were being transferred to the team that was trying to program the system and it really slowed down the process.

Note. Narratives are sourced from interviews

This study is of value to the business because the findings provided strategic value analysis, based on hospital managers' perceptions, which can assist other hospital managers to facilitate a more efficient transition to new HIT. The interview questions offered a structure for assessing strategies, which revealed useful competitive practices. Businesses need to strive for strategic value. MHS must strive for strategic value in a changing health care environment.

Business leaders, transitioning to new information technology will find the results of this study informative. Chao, Hu, Ung, and Cai (2012) specified the monumental amount of resources needed to achieve adoption of EHR, which included the high costs of implementation and system maintenance. Leaders of health care organizations place a sizeable investment into HIT. Moores (2012) noted EHR adoption leads to increased efficiency and a higher quality of data available in patient records. Through persuasive language or social pressuring, giving as much training as possible and implementing the entire site in a big bang, organizations achieve higher levels of adoption.

Implications for Social Change

Innovations in technology happen consistently. Change is often hard to manage and resisted by staff. Change often brings with it feelings of frustration. Increasing adoption of EHR systems improves care coordination for individual patients, and improves population health for whole communities (Brailer, 2010). The strategies of implementing the entire site in a big bang, training, and social pressure apply to any business, which is implementing new information technologies. These strategies may also decrease the frustration experienced by staff as the transitions occur.

Recommendations for Action

The findings from this study combined with the findings from related studies in the academic literature were the sources where insights were drawn to offer this recommendation for action. Health care managers and managers of other organizations planning to implement new information technology are the relevant audiences for this study. Ličen, Hartmann, Repovš, and Slapničar (2016) found social pressure was as effective as monetary incentives for improving use behavior. Therefore, business leaders should use social pressure; the pressure social-groups can use because of a person's desire to be seen in a positive social light, to increase user acceptance. Because of the similar results achieved between monetary incentives and social pressure, smaller organizations, which do not have the funding for financial incentives for employees should focus on the social pressure strategies. I planned to disseminate the findings from this study through submitting an article for publication to a peer-reviewed journal such as the Journal of Healthcare Management.

Recommendations for Further Research

Recommendations for further studies are to look more specifically into training and see what worked better at the sites, which transitioned later. This information would be invaluable to operations with fewer sites needing to transition to new information technology as it could make the transitions occur more smoothly. This study was a qualitative study; therefore, conducting quantitative studies on the topic of MHSs transitioning to new HIT performed as quantitative studies is another area for further research. The location of the research was a limiting factor and opens an area for further

research in seeing if these themes hold true for other regional areas outside the Pacific Northwest.

Reflections

I studied the topic of EHR system transitions at an MHS for over 3 years. I had very definitive ideas coming into this study that EHR systems are much more efficient than paper systems, and those ideas have not changed. I had to work hard to make sure that I did not interject this bias into my findings and allowed my participants to reflect their opinions and viewpoints.

Changing careers in the midst of the study was very challenging, and I feared my former employer would not allow an outside researcher into the facilities to conduct research. Receiving the organization's IRB approval, was a huge relief. Surprisingly, the participants enjoyed the interview sessions and made time in their busy schedules for the follow-up meetings for member-checking.

Conclusions

This study contains information relevant to leaders, who are interested in transitioning to new information technology systems in an efficient and non-disruptive manner. The findings of this study apply to health care organizations as well as other business endeavors. Further, the findings of this study may serve as a strong foundation for additional research on the topic of EHR system transitions at an MHS.

Three major themes emerged: (a) hybrid implementation strategy, (b) training strategy, and (c) social pressure strategy. The themes of social pressure strategy and training strategy offer avenues for potential research. However, the managers at the MHS

used these three themes as strategies to transition successfully to the new interoperable EHR system.

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Appendix A: Cover Letter

Date

Dear _____:

My name is Valerie Drill, and I am a Doctor of Business Administration (DBA) candidate at Walden University. I am conducting a doctoral study project to examine how hospital administrators in the Pacific Northwest the transition from an older EHR system to a new Medicare/Medicaid compliant EHR system at a multisite hospital system. My study is intended to explore the following question: What strategies do health care administrators use for a successful upgrade to a compliant EHR system at an MHS?

Based on your experiences with the administration of a multisite hospital system transitioning from an older EHR to a new interoperable and legally compliant EHR system, I would like to interview you in order to gather information about your perceptions and beliefs about strategies healthcare administrators may use for a successful upgrade to a compliant EHR system at a multisite hospital system. The interview will require 60-90 minutes of your time and will be scheduled at your convenience within [INSERT TIME PERIOD FOR INTERVIEW PROCESS FOLLOWING COMPLETION OF IRB PROCESS]. I will conduct this in-person interview at a location that is most convenient for you. If an in-person interview is not possible due to schedule constraints, I will conduct the interview over the telephone; however, an in-person interview is preferred for this research.

Your participation in my study will be instrumental in ensuring that I gather data from a spectrum of health care leaders at the multisite hospital system with direct knowledge of the transition to the compliant EHR system. If you express interest in participating in my study, I will send you an informed consent form via e-mail for your review. This informed consent form provides background information on the study and outlines your rights during the interview process. Please contact me if you have any questions or require additional information.

I kindly request a response to this email indicating your interest in participating by [RESPONSE DATE TO BE INSERTED AFTER INTERVIEW TIME PERIOD IS FINALIZED FOLLOWING IRB APPROVAL]. A response of declining to participate is requested but not required. I thank you in advance for your consideration and your support of my study of a topic of national significance.

Sincerely,
Valerie Drill

Appendix B: Interview Protocol

What you will do	What you will Say--Script
<p>Bring coffee, tea or water (as indicated when scheduling meeting time) to meeting location (skip this if conducting telephone interview). Have informed consent form. Have I pad ready to record after consent is given.</p>	<p>This interview is to explore the strategies used in transitioning from an older EHR system to a new EHR system. Hopefully the information gained will assist other administrators in the future who are making similar transitions. The questions are open ended allowing you to expand your answers and give detail rich information, please feel free to include anything you feel is relevant.</p>
<ul style="list-style-type: none"> • Watch for non-verbal queues • Paraphrase as needed • Ask follow-up probing questions to get more in depth. <p>Probing question help list:</p> <ul style="list-style-type: none"> • Why? • How do you ...? • What were you trying to achieve? • Why were your expectations so high/ so low? • If you could start over what would you do differently? 	<ol style="list-style-type: none"> 1. What perceived ease of use considerations were factors for the decision on which HIT to purchase? 2. What perceived usefulness considerations were factors for the decision on which HIT to purchase? 3. What perceived ease of use considerations facilitated the transition to the interoperable EHR system? 4. What perceived ease of use considerations impeded the transition to the interoperable EHR system? 5. What perceived usefulness considerations facilitated the transition to the interoperable EHR system? 6. What perceived usefulness considerations impeded the transition to the interoperable EHR system? 7. How was training an influence on the successful transition from an older EHR to a compliant system in terms of perceived ease of use? 8. How was training an influence

	on the successful transition from an older EHR to a compliant system in terms of perceived usefulness?
Wrap up interview thanking participant	Thank you so much for your time and sharing your experiences with me.
Schedule follow-up member-checking interview	I would like to meet again to review a summary of your answers to the interview questions. Would _____ work for you on next _____ day?

Appendix C: Follow-up Member-Checking Interview Protocol

What you will do	What you will Say--Script
Introduce follow-up interview and set the stage	This interview is to member-check the understanding that I have of the information given in the previous interview.
<p data-bbox="298 543 829 611">Share a copy of the succinct synthesis for each individual question</p> <p data-bbox="298 653 829 793">Walk through each question, read the interpretation and ask: Did I miss anything? Or, What would you like to add?</p>	<ol style="list-style-type: none"> <li data-bbox="922 543 1421 793">1. What perceived ease of use considerations were factors for the decision on which HIT to purchase? -And a succinct synthesis of the interpretation—perhaps one paragraph or as needed. <li data-bbox="922 800 1421 1050">2. What perceived usefulness considerations were factors for the decision on which HIT to purchase? -And a succinct synthesis of the interpretation—perhaps one paragraph or as needed. <li data-bbox="922 1056 1421 1306">3. What perceived ease of use considerations facilitated the transition to the interoperable EHR system? -And a succinct synthesis of the interpretation—perhaps one paragraph or as needed. <li data-bbox="922 1312 1421 1562">4. What perceived ease of use considerations impeded the transition to the interoperable EHR system? -And a succinct synthesis of the interpretation—perhaps one paragraph or as needed. <li data-bbox="922 1568 1421 1818">5. What perceived usefulness considerations facilitated the transition to the interoperable EHR system? -And a succinct synthesis of the interpretation—perhaps one paragraph or as needed. <li data-bbox="922 1824 1421 1843">6. What perceived usefulness

	<p>considerations impeded the transition to the interoperable EHR system? -And a succinct synthesis of the interpretation—perhaps one paragraph or as needed.</p> <p>7. How was training an influence on the successful transition from an older EHR to a compliant system in terms of perceived ease of use? -And a succinct synthesis of the interpretation—perhaps one paragraph or as needed.</p> <p>8. How was training an influence on the successful transition from an older EHR to a compliant system in terms of perceived usefulness? -And a succinct synthesis of the interpretation—perhaps one paragraph or as needed.</p>
Wrap up interview thanking participant	Thank you so much for your time and reviewing the summaries with me.
Schedule follow-up member-checking interview (if needed).	I would like to meet again to review a summary of your answers to the interview questions. Would _____ work for you on next _____ day?

Appendix D: Document Review Protocol

What you will do	How you will do it
For each publicly available document used in the study this review will be used..	
The document will be actively read. Notes will be taken to answer each of the interview questions as information is available pertaining to that question.	<ol style="list-style-type: none"> <li data-bbox="917 569 1421 856">1. What perceived ease of use considerations were factors for the decision on which HIT to purchase? - Notes of location in document and what was stated in the document regarding the interview question. <li data-bbox="917 856 1421 1144">2. What perceived usefulness considerations were factors for the decision on which HIT to purchase? - Notes of location in document and what was stated in the document regarding the interview question. <li data-bbox="917 1144 1421 1432">3. What perceived ease of use considerations facilitated the transition to the interoperable EHR system? - Notes of location in document and what was stated in the document regarding the interview question. <li data-bbox="917 1432 1421 1719">4. What perceived ease of use considerations impeded the transition to the interoperable EHR system? - Notes of location in document and what was stated in the document regarding the interview question. <li data-bbox="917 1719 1421 1845">5. What perceived usefulness considerations facilitated the transition to the interoperable

	<p>EHR system? - Notes of location in document and what was stated in the document regarding the interview question.</p> <p>6. What perceived usefulness considerations impeded the transition to the interoperable EHR system? - Notes of location in document and what was stated in the document regarding the interview question.</p> <p>7. How was training an influence on the successful transition from an older EHR to a compliant system in terms of perceived ease of use? - Notes of location in document and what was stated in the document regarding the interview question.</p> <p>8. How was training an influence on the successful transition from an older EHR to a compliant system in terms of perceived usefulness? - Notes of location in document and what was stated in the document regarding the interview question.</p>
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