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Managerial Strategies for Maximizing Benefits From Electronic Health Record Systems

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Abstract

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Abstract

In 2009, the U.S. government allocated $27 billion to health care agencies for electronic health records (EHRs) implementation. The increased use of EHR systems is expected to drive down health care costs and increase profits. To meet this anticipated return on investment (ROI), hospital managers need to be able to successfully design, deploy, and manage EHR systems. The purpose of this single case study was to explore organizational management strategies that hospital managers can use to ensure their investments in EHRs meet targeted ROIs and work efficiency goals. The conceptual framework for this study was based on the technology acceptance model. Primary data were collected from a criterion sample of 6 hospital managers with direct experience designing and implementing successful EHRs in a small hospital in the Northeastern United States. Secondary data were collected using public financial records available on the Internet. After cataloging and grouping the raw data, 4 emergent themes were identified: (a) training, (b) the role of organizational management strategies, (c) technological barriers, and (d) ongoing support and maintenance. Findings may contribute to social change through an increase in the quality of patient care and making health care records more accessible to doctors in isolated areas.

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Dedication

I dedicate this doctoral study to Adrienne Verity whose love and companionship kept me going. In addition, I dedicate this study to Pamela Smith who helped me find the joy in life. And lastly, I dedicate this study to Deidre Bowie-Mills who has always been willing to listen to me.

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To my dear friend Carleigh Hannah, who took the time to assist me and was instrumental for the completion of my data collection. I could not have completed this without you.

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Section 1: Foundation of the Study

Hospitals across the United States increasingly deploy electronic health records (EHRs) to improve the medical record usability, improve the patient experience, and decrease health care expenses (Heart, Ben-Assuli, & Shabtai, 2017). However, resistance to EHR implementation has emerged among the health care community (Rhoda & Brown, 2017; Sternberg et al., 2017). The benefits of EHR implementation are not always sufficient to guarantee that hospitals can meet return on investment (ROI) goals (D. Y. Shin et al., 2012). Moreover, the increased use of EHRs has not improved the quality of medical services (Mehta, Vakharia, & Wright, 2014).

Background of the Problem

Interest in the growing size of medical record databases began in the late 20th century. An average hospital in the United States produces more than 665 terabytes of data annually (Wills, 2014). In 2009, the U.S. government allocated $27 billion to health care agencies for EHR implementation (Moja et al., 2014). The deployment of EHRs is expected to alleviate growing health care costs and increase the quality of patient care (Heart et al., 2017; P. Shin & Shirac, 2013). For health care managers, the problem is how to deploy an EHR system that is profitable and usable.

The prevalence of EHRs has created an abundance of digitalized medical records. However, not all deployed EHR systems have provided the expected return. Some small- and medium-size medical facilities experienced a significant increase in medical expenses after EHR implementation (Adler-Milstein, Salzberg, Franz, Orav, & Bates,

2013). Providing organizational management strategies for EHR implementation may assist health care managers with improving and growing health care agencies.

Problem Statement

Some EHR implementations in hospitals do not result in the anticipated financial benefits related to greater work efficiency and reduction in expenses (Boonstra, Versluis, & Vos, 2014). By 2012, 76% of U.S. hospitals had adopted a full EHR system, yet less than 30% of health care facilities investing in her systems reported a positive ROI (Sherer, Meyerhoefer, & Peng, 2016). The general business problem was the inability to realize the financial benefits of EHR implementations, which results in a loss of profitability for hospitals. The specific business problem was that some hospital managers lack organizational management strategies to ensure their investments in EHRs meet targeted ROI and work efficiency goals.

Purpose Statement

The purpose of this qualitative single case study was to explore organizational management strategies that hospital managers can use to ensure their investments in EHRs meet targeted ROIs and work efficiency goals. I focused on a single hospital in the Eastern United States. Data sources included semistructured interviews and archival records. I selected hospital managers with direct experience designing and implementing successful EHRs. The results of this study may assist hospital managers with strategies for achieving targeted ROIs and work efficiency goals from EHR design and deployment. The implications for positive social change include the potential to increase the quality of

patient care by providing hospital managers with increased organizational management skills.

Nature of the Study

I used the qualitative method for my study. Qualitative research methods are viable in the field of information science and technology (Freeman, Gergen, & Josselson, 2015). The qualitative approach was more appropriate than quantitative or mixed methods because the purpose of the study was to understand health care business leaders' perspectives and their approach to designing and implementing EHR systems. Quantitative and mixed-method approaches were not suitable for my study because I did not plan to examine the relationships or differences among variables (see Ridder, 2017). Due to the ever-changing nature of information science, qualitative research may lend a perspective on various phenomena in the field. Freeman et al. (2015) expressed optimism that applying qualitative methods may expand researchers' understanding of multiple phenomena. Given the multiple methods available for qualitative research, qualitative inquiry presents a research climate that is open and inclusive (Freeman et al., 2015).

I used a single case study design. A case study enables researchers to identify and explore different issues for a set of distinct circumstances through numerous sources of evidence (Yin, 2014). Using a case study design allowed me to focus on one hospital and explore the different sets of processes that influence EHR implementation success. One of the advantages of using a case study is the researcher's choice of multiple sources of data (Yin, 2014). Because of the use of multiple sources of evidence, case studies are becoming a preferred research design in the social sciences (Turner & Danks, 2014). A

case study involves exploring behavior in a natural setting, so many researchers argue that case studies have solid real-world implications (Larrinaga, 2017).

There were several designs available for my study. All qualitative designs have strengths and weaknesses. Grounded theory research is appropriate for creating and advancing a theory (Lewis, 2015; Lokke & Sorensen, 2014). Researchers use narrative designs to understand participants' life stories and their relationships to the world (Lewis, 2015; Mukhopadhyay & Gupta, 2014). An ethnographic design would be the best choice for uncovering cultural patterns to better understand group behavior (Lewis, 2015). Although most qualitative designs enable researchers to gain a deeper understanding of a phenomenon through a descriptive analysis (Mukhopadhyay & Gupta, 2014), a single case study was the most appropriate design for my study.

Research Question

What organizational management strategies do hospital managers employ to ensure their investments in EHRs meet targeted ROIs and work efficiency goals?

Interview Questions

1. What goals did you set for your EHR system's ROI?
2. What were the project strategies for designing and implementing your hospital's EHR for achieving the targeted ROI?
3. How did you develop and deploy the strategies?
4. How did you ensure that your EHR met work efficiency goals?
5. What tool(s) did you use to measure work efficiency?

6. What barriers did you encounter in deploying and implementing the EHR system?
7. How did you address the barriers?
8. What metrics did you use to measure the success of your EHR system?
9. Based on those performance metrics, how do the current performance levels and trends compare with the goals you set for your EHR system?
10. In thinking back on EHR design, development, and implementation, what if anything would you do differently?

Conceptual Framework

I used the technology acceptance model (TAM) as the conceptual framework for the study. TAM is an information systems theory that models how users come to accept and use technology (Fathema, Shannon, & Ross, 2015). There have been several iterations of TAM theory. Davis proposed the original TAM in 1989 (Venkatesh & Davis, 2000). Subsequent iterations included TAM 2 and the unified theory of acceptance and use of technology (UTAUT) in an attempt to understand and predict user acceptance (Venkatesh, Morris, Davis, & Davis, 2003). TAM theorists suggested that there is a relationship between how easy technology is to use and people's willingness to adopt that technology (Venkatesh et al., 2003). Additional motivating factors for acceptance of new technologies include users' cognitive abilities and perceived enjoyment from using the technology (Poh-Ming, May-Chium, & Ramayah, 2014). Hospital managers can reduce user anxiety, improve technology acceptance rates, and increase user efficiency goals by incorporating an acceptance model with the deployment of health care technology

(Kohnke, Cole, & Bush, 2014). Venkatesh and Davis (2000) developed the current TAM theories relating to employee acceptance and use of technology. For health care agencies to be successful and grow, employees (including staff and health care providers) need to be able to use technology to enter, retrieve, and analyze accurate patient data (Adler-Milstein, Everson, & Lee, 2015). Some early researchers explored the relationship between the TAM and workers' social setting and cognitive skills (Venkatesh & Davis, 2000). The early theorists placed emphasis on users' comfort and familiarity with technology as opposed to managerial and organizational support.

Researchers have also focused on TAM and managerial concepts and practices. The design and implementation of organizational management strategies have a direct impact on workers' abilities to use technology (Hsiao & Chen, 2016). It has been over 20 years since the introduction of digital medical records, but the technology has not gained overall acceptance (Kohli & Tan, 2016). Usually, the focus for hospital managers is the technical aspect of EHR deployment, such as hardware and software requirements (Fickenscher & Bakerman, 2011). Ignoring TAM sometimes results in advanced technology but poorly adopted EHR systems for hospitals, which often do not meet ROI targets (Fickenscher & Bakerman, 2011). An important aspect of the TAM is the emphasis on perceived usefulness. Chia-Ying (2015) surmised that users can perceive technology innovations as difficult or challenging and still be willing to adopt the technology as long as it is beneficial to the user.

Operational Definitions

The following definitions, which are technical or specific to the field, provide clarity to the study.

Electronic health record (EHR): EHRs are digital versions of patient health records. EHRs contain much of the same information as hard copy records, including a patient's medical history, prescriptions, and vitals (Krist et al., 2014).

Electronic medical record (EMR): EMRs are patient medical records that are stored on an electronic device, computer, or tablet for ease of storage and retrieval. EMRs are synonymous with EHRs and contain the same patient information as hard copy records (Tall, Hurd, & Gifford, 2015).

Health information exchange (HIE): HIE is the attempt at making electronic health information interoperable and available across different types of health care organizations (Ko, Murphy, & Bindman, 2015).

Technology acceptance model (TAM): Venkatesh and Davis (2000) developed the current TAM theories relating to employee acceptance and use of technology. TAM theory suggests that there is a relationship between how easy technology is to use and people's willingness to adopt that technology (Venkatesh et al., 2003).

Telemedicine: Telemedicine is the distribution of electronic medical records between two or more locations (Ajami & Lamoochi, 2014).

' *Unified theory of acceptance and use of technology (UTAUT)*: UTAUT is closely related and an extension of the TAM. The theory covers user expectations and social influences that determine the intent and use of technology (Venkatesh et al., 2003).

Assumptions, Limitations, and Delimitations

All case studies are subject to assumptions, limitations, and delimitations. Assumptions are aspects of the study that the researcher lacks control over and that are expected to be true without empirical evidence (Porra, Hirschheim, & Parks, 2014). My assumptions were based on user participation and accurate responses from my interviewees. Limitations are methodological constraints that may reduce the effectiveness and usefulness of the findings (Houghton, Casey, Shaw, & Murphy, 2013). Delimitations are intentional boundaries set by the researcher in an attempt to determine which areas are significant to warrant inclusion (Yuan & Bhattacherjee, 2014). It is possible that an overlooked area could account for some unknown findings in this study.

Assumptions

I conducted this single case study based on three assumptions. The first assumption was that participants understood the technical terms used in the interview process and answered all questions with truthfulness and sincerity. The second assumption was that terms such as ROI have a common and collectively agreed upon definition. The third assumption was that the data accurately reflected the experiences of managers and information technology specialists, and that the data represented a shared history that can be used for the general purpose of improving EHR implementation.

Limitations

There were three limitations in the study. The first limitation reflected a practical constraint. The research sample did not include every hospital in the Northeastern United States. The limitations of a case study involve the lack of diversity of subjects that other

studies possess (Yin, 2014). It was necessary to limit the number of people interviewed and the number of questions asked. The second limitation was the design did not allow for an opportunity to observe participants. The third limitation was the lack of experiences and observations from other regions. It would be beneficial to perform additional interviews with different size hospitals in other U.S. states and around the world.

Delimitations

Delimitations are characteristics of the study that the researcher controls that limit the scope and clarify what the study does not cover (Yazan, 2015). The first delimitation of the study was the purposive sample of hospital managers directly involved with the design and deployment of EHRs. Internal and external stakeholders' experiences with implementing EHRs were beyond the scope of the study. The second delimitation was the geographical constraint. I selected a medium-size hospital in the Northeastern United States for my single case study.

Significance of the Study

Contribution to Business Practice

As the amount of digital data continues to grow, business leaders have to develop new and innovative organizational strategies to keep pace with their competition. For U.S. hospitals, there is an urgency to develop successful organizational strategies and practices for implementing EHRs, which have the impetus of both government support and government incentives (Moja et al., 2014). The results of this study may assist health care leaders in developing organizational strategies for designing and deploying EHRs.

Though the focus of this study was the design and deployment of EHRs in the health care industry, the results may be useful to anyone involved in designing and deploying other types of electronic records, such as education records. It should be feasible to apply the findings of this research to other fields such as supply chain management and predictive analysis. The results may be applicable to other industries, such as education, that struggle with developing organizational management strategies and the implementation of digital record systems.

Implications for Social Change

The results of the study may assist health care leaders in increasing the quality of patient care through a better understanding of EHRs. EHR use increases global social capital. Social capital is defined as business capital that helps to alleviate social problems (Seferiadis, Cummings, Zweekhorst, & Bunders, 2015). Increased EHR adoption allows physicians better access to patient records to make better decisions regarding patient care. The results of the study may provide health care managers with organizational skills that may increase the quality of care for patients (Sherer, 2014). There are potential social benefits from the global implementation of EHRs, such as assisting geographically isolated physicians and health professionals in obtaining patient records (Ajami & Lamoochi, 2014). Through the use of EHRs, telemedicine, and e-prescriptions, health professionals could better assist victims in disaster areas.

A Review of the Professional and Academic Literature

My review of the academic and scholarly literature includes a brief history of EHRs covering the effect of government incentives. I describe some of the barriers to

EHR deployment, including financial and technical issues. I also provide critical analysis of the business problem and how some hospital managers lack organizational management strategies to ensure their investment in EHRs meet targeted ROIs and work efficiency goals.

Title Searches, Articles, and Journals

The following literature review includes references obtained from online searches using databases available from the Walden University library. The Walden University library includes EBSCOHost, SAGE Premier, and ProQuest Central scholarly databases. The types of works were a mixture of peer-reviewed articles, scholarly journals, and seminal books. Over 85% of the journals consulted are refereed or peer-reviewed, and the articles were published within the last 5 years. The key words used for search terms included *big data, health care digital data, EHR implementation, EHR deployment, EHR design, electronic medical record (EMR), computerized medical record (CMR), technology acceptance model (TAM) health services, data overload,* and *organizational management IT*. Digital patient records may be known by several interchangeable acronyms: (a) EHR, (b) CMR, and (c) EMR, (Heart et al., 2017). For the purposes of my study, I elected to consistently use the acronym EHR when referring to local digitalized patient records and acronym HIE when referring to networked EHRs.

History of EHRs

Interest in the growing number of medical records began in the mid 20th century. The two main driving principles were the need for shared patient records and the mitigation of growing health care costs. The first driving principle reflects the need for

electronic storage and retrieval systems to make patient data available for physicians at different locations (Adler-Milstein et al., 2014; Mehta et al., 2014). The second driving principle relates to the growing cost of managing a large database of patient records (D. Y. Shin et al., 2012). The deployment of EHRs is expected to alleviate growing health care costs and increase the quality of patient care (Heart et al., 2017; P. Shin & Shirac, 2013).

Hospital managers and health care strategists have traditionally employed technology and IT to improve the delivery of health care and to reduce the costs of health care (DeVoe, Angier, Burdick, & Gold, 2014). Digitalized patient records have the potential of increasing the quality of patient care (Sherer, 2014) and providing medical records to health professionals in geographically isolated regions (Ajami & Lamoochi, 2014; Valentino, 2016). In 1997, representatives of the Institute of Medicine (IOM) suggested that health care facilities adopt EHRs (Krist et al., 2014). The last decade has seen a rise in medical information, especially sensitive and medically critical information (D. Y. Shin et al., 2012). In order to grow financially, hospitals need to be able to manage information effectively and responsibly (Foldy, Grannis, Ross, & Smith, 2014).

In the 2000s, the U.S. government provided monetary incentives to assist health care facilities with the deployment of EHRs (Moja et al., 2014). Even with professional recommendations and government incentives, there has been resistance to adopting EHRs in U.S. hospitals. In 2008 only 17% of hospitals employed EHRs for medical records, and by 2013 80% of hospitals reported using EHRs (Asan, Smith, & Montague, 2014). The emergence of the Internet and more powerful network-ready computers has created the

possibility of networking geographically separate EHRs into unified exchanges (Hill, Du Fresne, Holder, Samudio, & Sajana, 2015).

HIE and telemedicine. The prevalence of electronic health records has created an abundance of digitalized medical records. Health information exchanges (HIE) are an attempt to help health professionals navigate these records; HIEs also create an interoperable platform between enrolled health care facilities (Hill et al., 2015). The aim of HIEs is to capture, store, and share patient information. The purpose of implementing an interconnective HIE is to mitigate avoidable medical errors, such as duplicate testing and prescription errors (Langabeer, Champagne, & Sullivan, 2016). HIEs have the potential to help at-risk patients in different types of health care facilities. At-risk patients include the underinsured and vulnerable patients (Ko et al., 2015).

Closely related to HIE is the practice of telemedicine. Telemedicine is the practice of distributing electronic medical records between two or more locations (Ajami & Lamoochi, 2014). The rise of telemedicine is in response to the need for medical treatment in remote areas or in disaster locations where physicians do not have access to traditional medical records (Ajami & Lamoochi, 2014). The demand for telemedicine represents a shift in IT focus from assisting medical procedures to providing and sharing information (Gheorghe & Petre, 2014).

The use of EHRs in HIEs and telemedicine offers the potential for positive social change. Telemedicine provides electronic patient records to physicians and health professionals who would otherwise be unable to obtain vital patient records (Ajami & Lamoochi, 2014). Moreover, the global exchange and availability of digitalized patient

records reduce the likelihood of medical errors, prescription errors, and duplicate procedures (Langabeer et al., 2016).

Effective HIEs require interoperability. One of the barriers to successful implementation of HIEs and telemedicine is the lack of a consistent design across the various types of health care facilities (Hill et al., 2015). The lack of interconnectivity can be attributed to different types of organizational management strategies and different types of organizational cultures. U.S. hospitals and community health centers exhibit differences that have impeded the progress of realizing a fully sustainable HIE (Ko et al., 2015). Hill et al (2015) found that hospital EHRs and subsequent HIEs are not usually compatible with systems used by private practices. The challenge is in finding a cross-platform solution that is flexible enough to accommodate the needs of several different types of facilities, including primary care clinics and hospitals, but also has the built-in consistency to allow data to be meaningfully reproducible (Salifu, Hafeez-Baig, & Soar, 2017).

Arizona's statewide HIE. Aside from federal government initiatives to promote EHR and HIE adoption rates, local governments have also attempted to increase EHR use. In 2005, Arizona became the first U.S. state to implement a statewide HIE (Valentino, 2016). Arizona legislatures established the Arizona Health-e Connection in 2007 with the goal of sponsoring statewide initiatives to increase HIE adoption and to educate physicians and medical staff about EHR use (Valentino, 2016).

Incentives to Increase EHR Adoption

The size, breadth, and scope of available electronic data have increased

exponentially over the past decade. In 2009, the U.S. government allocated $27 billion to health care agencies to implement EHRs (Moja et al., 2014). As of 2012, 44% of U.S. hospitals had some basic form of electronic medical records (Chow-White, MacAulay, Charters, & Chow, 2015). Other government regulations have followed these monetary incentives.

The Health Information Technology and Economic and Clinical Health (HITECH) act established three primary requirements for the adoption of EHRs: Hospitals should use a certified EHR, the EHR should be used to improve patient care, and participating hospitals are required to submit data pertinent to the use of their chosen EHR (Frazee, Harmon, & Papaconstantinou, 2016). The HITECH act provided Medicaid and Medicare incentives to medical facilities that adopt an EHR system (Rhoda & Brown, 2015). The goal of the HITECH act is to increase the quality of patient care while lowering the overall costs of health care (P. Shin & Sharac, 2013).

The Affordable Care Act (ACA) established the need for increasing the use of EHRs. Through changes to federal law derived from the ACA, U.S. hospitals and medical facilities receive incentives to establish electronic records within their IT infrastructure (Sternberg et al., 2017). Other countries have also initiated their own plans to implement EHRs. Canada has been deploying a universal EHR system, and one of the challenges has been to ensure interoperability across different types of medical facilities (Gheorghiu & Hagens, 2016).

In addition to government incentives, there have emerged some potential penalties for health care facilities that fail to implement EHR. The American Recovery and

Reinvestment Act of 2009 requires hospitals to implement certified EHR systems or be subject to financial penalties (Frazee et al., 2016). In accordance with this legislation, hospitals that fail to adopt EHRs by 2015 may lose a portion of Medicare funding (Frazee et al., 2016).

EHR Barriers

Though government incentives have increased adoption rates in the United States, there has been some resistance. Initial costs are part of the hesitancy for health care facilities considering EHR adoption (Sternberg et al., 2017). Though government incentives have helped mitigate this factor, the government funds associated with EHRs are not available to all health care facilities (Heart et al., 2017). Another barrier to EHR deployment is the concern for privacy and security. IT staff need to ensure that EHR systems remain compliant with security issues. Patients have a right to a secure and protective medical records system, and this security is guaranteed with the HIPAA act (Rhoda & Brown, 2017). Moreover, medical professionals and medical staff have resisted the change due to fears associated with a change in the way they perform their duties (Chow-White et al., 2015).

Financial Barriers

Hospital business leaders continue to seek ways to remain solvent. Because of decreased revenue and increased medical expenses, U.S. hospitals seek innovative ways to reach sustainability (DeVille & Evans, 2015). Traditionally, hospitals have sought to decrease medical costs by implementing new and more efficient technology (Salifu et al., 2017). In the 21st century, the shift in the roles of IT has been from assisting in medical

procedures to making information more readily available (Gheorge & Petre, 2014). Hospital managers seek to leverage new technology, such as EHRs, to provide a competitive advantage (Lian, Yen, & Wang, 2014).

Measuring a return on investment (ROI) for EHR implementation is not straightforward. Part of the problem is determining the total cost of ownership. The cost of EHR implementation involves a related infrastructure and organizational upgrade, and these costs must be distinguished from the technological expenses (Adler-Milstein et al., 2014). External stakeholders and financial officers keep looking for ways that electronic medical records will cut expenses and increase revenue (Meaux & McCarthy, 2014).

External monetary incentives, even in the form of health insurance and Medicaid influence, were not enough to ensure a positive ROI from EHR use (D. Y. Shin et al., 2012). The internal resources of a hospital showed a more direct correlation with willingness to adopt electronic records (D. Y. Shin et al., 2012). A survey showed that larger health care facilities, those with 12 or more physicians, were more likely to have a favorable view of EHRs (Furukawa et al., 2014). Small and rural health care facilities cite the lack of funds for deploying and supporting EHRs (Mason, 2015).

The expense of adopting an enterprise EHR system is one of the barriers for small- to medium-size hospitals (Slight, Quinne, Avery, Bates, & Sheikh, 2014). Slight et al. (2014) identified four key factors for determining costs for new EHRs: (a) software and hardware, (b) staff training, (c) facilities or physical space, and (d) other expenses. Choosing the appropriate scale of hardware, the correct software, or proper training can greatly impact the price of EHR adoption. Some small- and medium-size medical

facilities experienced a significant increase in medical expenses after EHR implementation (Adler-Milstein et al., 2013).

Another factor in determining improved business performance, maximizing organizational profitability, and meeting ROI goals is employee efficiency. Hospital staff and medical practitioners look to EHRs to provide better care for their patients (Meaux & McCarthy, 2014). Research indicated no direct relationship between EHRs and improved time management or worker efficiency (Tsai, Pancoast, Duguid, & Tsai, 2014).

There have been notable improvements in the types of tasks physicians spend time doing. Research suggested that post-EHR implementation doctors shifted their focus from retrieving medical records to doing direct patient care (Tsai et al., 2014). A shift in focus from records management to patient care has the potential to increase the quality of care and reduce extraneous staff. Medical facilities in the United States reported a reduction of staff post-EHR deployment (Lam, Lee, & Chen, 2016). The reduction of operational costs associated with staffing offers a way to mitigate some of the initial costs of EHR deployment.

Technical Barriers

Two major obstacles to full EHR implementation are security and privacy concerns. Because EHRs are interoperable and should function wherever patient data are needed, different levels of users require different levels of access (Lipworth, Mason, Kerridge, & Ioannidis, 2017). With the increase in demand for telemedicine and the ubiquity of HIEs, there is a growing need for interoperable and web-based EHRs. Access controls become a more technically difficult solution when implementing cross-platform

and web-based EHRs (Salifu et al., 2017).

An example of a current web-based EHR is Practice Fusion. In 7 years the medical subscriber base grew from 92 health professionals to over 100,000 (Levingston, 2014). Practice Fusion is now the fourth largest EHR provider in the United States (Levingston, 2014). However, the two most prominent concerns reported by Practice Fusion users were privacy and security (Levingston, 2014).

These concerns regarding privacy and security are consistent with other studies of EHRs (Huang & Liu, 2015; Lipworth et al., 2017). A recent Chinese report indicated that patients feared the loss of privacy and a lack of anonymity regarding EHRs, though most patients still wanted their medical records to be electronically accessible to medical staff (Huang & Liu, 2015). People recognized the potential risks but also realized that there were great potential benefits from making medical records electronically available.

In order for the data provided by EHRs to be useful, it must be accurate and reliable. This presents another technical difficult when working with a voluminous amount of medical data. Kruse, Kristof, Jones, Mitchell, and Martinez (2016) organized the three prominent barriers to EHR implementation appear in the historical literature, cost prohibitive initial capital investment; inadequate technical support; and no meaningful assessments of the accuracy of the records. The need for a standardized security system becomes acuter once EHRs are networked between different types of health care organizations (Rhoda & Brown, 2017).

The success of an EHR system depends greatly on the investment, both initial investment and commitment to maintenance, and on the correct usage of the EHR system

(Gagnon et al., 2016; Kruse et al., 2016). Physicians, staff, and administration have different needs for an EHR, and for efficient deployment, the EHR system must work with all these different types of usage (Gheorghiu & Hagens, 2016). Just as different types of health care workers have different needs of their EHR system, different types of organizations have different concerns for the security and access levels for patient records (Lipworth et al., 2017).

Another technical barrier is the inability of the end user to properly use the EHR system. Yung-Ming's (2015) study showed that software characteristics, such as ease of use and ease of navigation, had a profound impact on end users' perceptions. Moreover, the user's perceived readiness to use a new technology affected performance outcomes and overall user satisfaction (Tong, Wong, & Lee, 2015).

Change Resistant Barriers

EHRs fundamentally change the way patient data are stored and retrieved, making EHRs a classic disruptive technology (Lipworth et al., 2017). There is usually a resistance to a change during the introduction of a new and disruptive technology. In addition to financial and technical barriers, there is the fear among health care professionals that EHRs might fundamentally alter the way health care professionals interact with their patients (Boswell, 2013). Lipworth et al. (2017) argued that for health care facilities to properly adapt to EHRs, medical staff must be willing to engage in an organizational paradigm shift. Organizational paradigm shifts often lead to a change in organizational management strategies (Ciutiene & Thattakath, 2014).

Boswell (2013) used a case study design to explore the impact of EHR

deployment in a health care institute in Pennsylvania. Boswell (2013) conducted interviews questioning employees concerning their actions toward the new EHR system and to identify its strengths and weaknesses. Boswell's (2013) findings described the employees' behaviors and strategies involved with the EHR implementation. The medical staff expressed a desire for support and training during the interviews (Boswell, 2013). The interviewees voiced some positive qualities of the new EHR, such as a better ability to manage patient records; however, the staff also expressed concern regarding their own adeptness at using the technology (Boswell, 2013).

One of the stated goals of EHR implementation is to improve time management and work efficiency by automating the record keeping process. Tsai, Pencoast, Duguid, and Tsai (2014) specifically looked at the time doctors spent performing various tasks and compared the results spent before and after EHR deployment. Tsai et al. (2014) concluded that EHRs did not improve time management or work efficiency. However, there were some notable improvements to the types of tasks physicians spent time doing. Tsai et al. (2014) findings indicated that after EHR implementation, doctors shifted their focus from retrieving records to other work. However, this shift in work did not directly translate into workplace efficiency or cost savings benefits (Tsai et al., 2014).

There are psychological consequences from significant workplace changes that can affect workplace efficiency and overall morale. Through an extensive quality review that consisted of structured interviews and focus groups, researchers McAlearney, Hefner, Sieck, and Huerta (2015) determined that health care workers experienced feelings that are indicative of drastic change. McAlearney et al. (2015) suggested that

hospital managers need to be cognizant of operational barriers and how to properly address change resistance. He et al. (2014) supported the concept that managerial support is crucial for mitigating the fears of paradigm shifts and drastic workplace changes.

Health care managers often employ dynamic capabilities to mitigate the resistance to change. Dynamic capabilities refer to the organizational management strategies that make it possible for organizations to remain flexible and open to change (Ciutiene & Thattakath, 2014). Cortez (2014) maintained that organizations can test innovations, in a variety of ways, to help ensure a smooth deployment. Organizational managers also have the option to adopt disruptive innovations on a short-term basis in order to mitigate risks. Both of these stances require a flexible organization management culture (Cortez, 2014).

Technology Acceptance Model

In the early 2000s, Venkatesh and Davis explored the relationship between the technology acceptance model (TAM) and workers' social setting and cognitive skills (Yuan & Bhattacherjee, 2014). TAM is a widely used and accepted conceptual model for a variety of studies related to the deployment and adoption of innovative technology (Khasawneh, 2015). According to TAM, technology users' attitude dictates purpose, and purpose informs technology users' actual behavior (Fathema, Shannon, & Ross, 2015). If medical staffs perceive that EHRs compliment their job duties, they will likely perceive EHRs as useful technology and develop a positive attitude toward EHRs (Gagnon et al., 2016; Sternberg et al., 2017). Figure 1 illustrates the relationship between the users' perceptions of usefulness and ease of use and the users' attitude and actual technology usage.

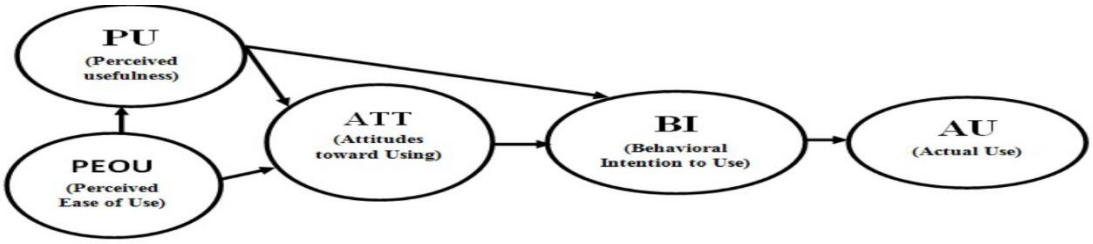

Figure 1. TAM flow chart representation. The TAM flow chart demonstrates how perceptions influence attitude and behaviors. Ultimately the final product is the technology users' actual behavior. From "Expanding the Technology Acceptance Model (TAM) to Examine Faculty Use of Learning Management Systems (LMSs) in Higher Education Institutions," by N. Fathema, D. Shannon, and M. Ross, 2015, *Journal of Online Learning and Teaching*, *11*, p. 212. Copyright 2015 by the Creative Commons Attribution-Non-Commercial-Share-Alike License. Reprinted under the terms of the Creative Commons Attribution-Non-Commercial-Share-Alike License found at https://creativecommons.org/licenses/by-nc-sa/3.0/us/legalcode

The users' attitudes are influenced by the perceptions of the usefulness of the technology and how easy that technology is to use (Fathema, Shannon, & Ross, 2015). Together these two attributes form a positive or negative attitude and influence how likely the technology is to be adopted (Fathema et al., 2015). Technology users' intentions are directly correlated to their behavior, and technology users' attitudes tend to inform their intentions (Olasina, 2015). Technology Users' attitude impacts how they use the technology and their intentions towards the technology (Fathema et al., 2015).

TAM has become a widely used conceptual model is various research fields of research, such as medicine and education (Khasawneh, 2015; Yuan & Bhattacherjee, 2014). The model is fluid enough to apply to any new technology and has a cross-cultural application (Mpinganjira, 2015; Olasina, 2015). Interestingly, health care facilities that already have a high level of technology are more accepting of EHR technology (Lian, Yen, & Wang, 2014). The correlation between technology adeptness and technology

acceptance relates to the TAM model in that it demonstrates the importance of the end user's perceived usefulness (Fathema et al., 2015).

Resistance to new technology can stem from a lack of awareness of the benefits of the new technology and a lack of proper training on how to use the technology (Kohnke, Cole, & Bush, 2014). Support and knowledge can help mitigate some the barriers for technology resistant users (Tarhini, Mgbemena, Trab, & Masa'deh, 2015). Change resistance barriers and technological barriers can be related to a lack of organizational management support in the areas of training and education (Cortez, 2014; Mason, 2015). Additional motivating factors for acceptance of new technologies include users' cognitive abilities and perceived enjoyment from using the technology (Poh-Ming, May-Chium, & Ramayah, 2014). Managers can improve user adoption rates by providing strategies that support users and increase participation (Hsiao & Chen, 2016). Hospital managers can reduce user anxiety, improve technology acceptance rates, and increase workplace efficiency goals by incorporating an acceptance model with the deployment of health care technology (Kohnke et al., 2014).

Any new technology that is introduced in the workplace has a potential value to the end user, though the end user may not always be aware of these potential benefits (Poh-Ming et al., 2014). Yuan and Bhattacherjee (2014) identified three types of potential value for new technology end users: utilitarian, hedonic, and communicative. A study conducted at a volunteer-dependent clinic analyzed the impact on physicians as EHR use increased, stripping the need for high volumes of volunteer staff (Tang, Chen, Semaan, & Robertson, 2015). For a hospital, understanding the interrelatedness between physicians'

goals, patient needs, and sociopolitical factors are necessary components for successful IT integration (Lian, Yen, & Wang, 2014).

Unified Theory of Acceptance and Use of Technology

Another theory, which is closely related to TAM, is the unified theory of acceptance and use of technology (UTAUT). In order for health care facility managers to get their workers to accept new technology that assists in data management, managers should provide support to reduce anxiety and increase proficiency (Kohnke et al., 2014). Organizational support relates to both health care leaders and physicians' willingness to purchase and adapt new technologies, such as commercial products designed to make the data retrieval process more fluid (Venugopala, Jinkab, & Privac, 2016). Additionally, the full benefits of an EHR system will not be realized if organizational management practices miss opportunities to advance the collection of patient demographic records (Douglas, Dawes, Holden, & Mack, 2015).

The slow pace of adoption of new technologies is especially apparent in developing nations, which some researchers suspected represents a lack of technical knowledge (Venugopala, Jinkab, & Priyac, 2016). A deficit in technical skills may be apparent in the users of an electronic system or with those in charge of managing clinical areas. Ingebrigtsen et al. (2014) found that clinical leaders with IT skills and prior project management experience led more successful electronic health record transitions than those without a specific technology background.

The organizational management strategy at the hospital should be open to realizing the scalability of medical records. This includes capturing data that hospitals

usually do not track, such as patient race, ethnicity, and religious background (Douglas, Dawes, Holden, & Mack, 2015). As opposed to oftentimes tacit paper records, EHR usage allows physicians to capture and record more information about a patient that can be passed on to future health care providers (Weir et al., 2015). The additional information can include contextual and social data about the patients, greatly increasing all patients' medical safety and quality of care.

Moody-Thomas et al. (2015) provided an example of how EHRs can assist physicians outside the bounds of traditional medical care. The practice of keeping nontraditional, electronic records, which EHRs make feasible, in public hospitals can assist health providers in helping patients quit smoking cigarettes (Moody-Thomas et al., 2015). This demonstrates some of the value added from EHR usage beyond simply making medical records more accessible. The rigidity in some EHR usage, especially the lack of qualitative narratives, can adversely affect the usefulness of electronic records (Varpio et al., 2015).

Seok et al. (2016) also explored the factors that influence end-users' intentions for utilizing EHRs. The most common use of EHRs for physicians included retrieving laboratory results (Seok et al., 2016). Nurses tended to use EHRs to retrieve notes and patient history (Seok et al., 2016). Both physicians and nurses made use of EHRs to monitor alerts and view inpatient lists (Seok et al., 2016). The results matched the users' intentions for usage and their actual usage. Seok et al. (2016) suggested that performance expectancy, effort expectancy, social influence, and facilitating conditions positively influence the users' behavior intentions toward EHRs (Seok et al., 2016). Of these,

performance expectancy was the strongest influence (Seok et al., 2016). Nurses and physicians who expected EHRs to increase their working performance were more likely to adopt the new technology (Seok et al., 2016).

Medical staff concerns. Other obstacles in providing immediate access to patient data, both for the patient and the health care worker, are security concerns and fear of increased workloads (Chow-White, MacAulay, Charters, & Chow, 2015; Tang, Chen, Semaan, & Robertson, 2015). Conversely, some research indicated that inherent institutional forces were not as influential to the success or failure of EHR implementation as individual physician's concerns (Gagnon et al, 2016). A multilevel analysis by Gagnon et al. (2016) demonstrated that managerial intervention was more successful when targeting individual resistance to EHR adaption instead of organizational strategies.

The conjunction of trust issues and technology acceptance is grounded in the UTAUT (Khasawneh, 2015; Venugopala, Jinkab, & Priyac, 2016). Health care facility workers' acceptable and efficient use of patient data helps build patient trust and ease concerns about privacy (Lipworth, Mason, Kerridge, & Ioannidis, 2017). Distrust and concerns about privacy are barriers that decrease the adoption of specific technologies, such as electronic medication record (EMR), which provide assistance to health care staff (Kohli & Tan, 2016). A fear related to a loss of patient privacy has prompted some to speculate possible government intervention and subsequent management of national EHR databases (Marlow, 2017). One of the factors that can decrease a user's perception of the usefulness of technology is a lack of trust (Tsai, 2014). Though the prevalence of EHRs

poses a risk to patient privacy, the proper usage of digitalized records has the potential of increasing patient safety while assuring medical record security (Muhammad, Telang, & Marella, 2015).

The expected benefits of EHR adoption include better patient care and more efficient and patient-centered use of hospital resources (Heart, Ben-Assuli, & Shabtai, 2017; P. Shin & Shirac, 2013). However, some of the reported negative consequences of EHR adoption are a physician's perceived focus on electronics instead of communicating with patients and taking a physician's attention away from the patient (Asan, Smith, & Montague, 2014). According to the National Research Council (NRC), this is due to poorly designed EHRs that complicate record keeping and do not assist physicians with improving patient care (Asan, et al., 2014). A poorly designed EHR requires more attention on technology usage and leaves less time for physicians to look at and engage with their patients (Asan et al., 2014). Physician to patient time and communication is directly correlated with patient satisfaction. Faber et al. (2015) conducted a study on patient satisfaction and determined that higher physician eye contact time was enough to increase a patient's overall satisfaction with their medical care.

In addition to concerns associated with barriers to the implementation of digital medical records there are problems associated with the validity and integrity of digital data (Gheorge & Petre, 2014). Gheorghe and Petre (2014) demonstrated the difficulty with accurately retrieving patient data, and the problems that errors created when patient data is improperly entered and stored. The problems that Gheorge and Petre (2015) identified are in contrast to Luther et al. (2015), who emphasized the benefit of electronic

health records and the organizational management strategies to support it.

Heorbst and Schweitzer (2015) focused on the interplay between a worker's inability to retrieve data, organizational management, and lack of support. In order for health workers to feel comfortable accessing and delivering data contained in digital form requires health care managers to embrace new organizational data management strategies (Heorbst and Schweitzer, 2015). In order for digital data to have a positive impact on health care, workers need to feel comfortable accessing and using this data (Kohli & Tan, 2016). Implementing new technology and demonstrating its effectiveness and efficacy was not enough to gain complete buy-in from workers who are expected to use it (Kohli & Tan, 2016). Organizational support, usually in the form of intervention and support, has been shown to increase EHR effectiveness (He et al., 2014).

EHR Adoption

There are clear benefits to the patient and to hospitals adopting electronic medical records (EHRs). Many medical deaths occur due to improper record keeping and untimely record retrieval (Meyerhoefer et al., 2016). The use of electronic health records can prevent some adverse events from occurring, increasing patient safety. Meyerhoefer et al. (2016) found a 37% reduction in severe birth incidences after EHR implementation. Along with increasing patient safety, EHR implementation has the potential of removing inefficiencies from health care, making medical records less costly and decreasing hospital expenses (Soto-Rey et al., 2015). The adoption of EHRs has allowed hospital staff to automate some systems, freeing up physicians to perform other patient related tasks (Soto-Rey et al., 2015). The increase in work productivity is usually not

instantaneous with EHR deployment and takes some time to develop (Meyerhoefer et al., 2016). Meyerhoefer et al. (2016) hypothesized that the delay in increased productivity was due to the increase adopting to new work practices and the need for technical training. Not all health care facilities experience an increase in revenue post EHR deployment. Hitt and Tambe (2016) studied nursing home EHR implementation in New York State. Nursing home work productivity increased by 3% after EHR implementation; however, on average, nursing home expenses increased by 2.7% (Hitt & Tambe, 2016).

There are broader benefits from establishing an electronically accessible medical records infrastructure. Successful EHR implementation may provide hospitals with the advantage for accessing other electronic health systems. EHR implementation can also play a role with other assistive health information technology, such as decision support systems and drug monitoring software (Abdel-Rahman et al., 2016).

Hoerbst and Schweitzer (2015) studied the success factors and barriers associated with clinical information systems (CIS), such as interagency EHRs, in integrated health care. The success factors consisted of different attributes, including technical and organizational. The barriers largely involved user deficiency. Heorbst and Schweitzer (2015) stressed the importance of administrative and managerial buy-in as a way to mitigate the barriers. One of the key factors cited for user-related barriers is the lack of training and support (Hoerbst & Schweitzer, 2015).

Muhammad, Telang, and Marella (2015) cited the exceptional cost of under-utilized data in patient care. Health care data, when made interoperable and available across platforms, provide the promise of better and more individualized health care

(Kruse et al., 2016). Despite the initial up-front cost of incorporating big data into health care, there are substantial gains. The gains can be long-term financial benefits to the institution and better work efficiency for doctors (Lian, Yen, & Wang, 2014; Meyerhoefer et al., 2016).

E-prescribing. The increasing presence of EHRs contributes to other medical assistive technology and this has given rise to additional incentive programs. In 2008, the Center for Medicare and Medicaid established incentives for the use of e-prescribing (Wright et al., 2014). The incentives included bonuses for facilities who adopted the system and penalties for facilities that did not (Wright et al., 2014). Even with these incentives, organizational management factors played a key role in successful adoption rates. Odukoya, Stone, and Chui (2015) found that the primary factors included communication, training, teamwork, and staffing levels sufficient to recover from initial errors with using the system. Odukoya et al. (2015) suggested that the most important elements for successful adoption of e-prescribing systems were an appropriate workplace culture and managerial support that facilitated teamwork, adequate training, and robust communication.

Disease registries. The prevalence of EHRs has given rise to another cross-functional product in the form of disease registries. Australian physicians have been using disease registries to track and manage patients with chronic diseases (Liaw, Taggart, & Yu, 2014). Working with cross-platform data registries requires that the information is accurate and consistent. The primary challenge is to ensure that the data quality accurately reflects the patient's condition and that the data are complete and

recognizable in other settings (Liaw et al., 2014). The Patient Protection and Affordable Care Act of 2010 supports the use of disease registries for the tracking and treatment of chronic conditions (Birkhead, 2017). Birkhead (2017) suggested that divergent systems used in Massachusetts and NYC, which are established to keep track of chronic conditions, should be partnered in order to create a more definitive tracking system. The potential of electronic records being available across state and even national lines also raises some concerns about patient safety and patient privacy (Rhoda & Brown, 2017). The concerns for privacy are heightened with the prospect of government and international access to patient records (Marlow, 2017).

Slow EHR Adoption Rates

A strong motivator for EHR adoption among U.S. health care facilities is the monetary government incentives (Moja et al., 2014). These monetary incentives have been followed by legislation that formulated requirements for EHR adoption by 2015, including HITECH and ACA (Frazee, Harmon & Papaconstantinou, 2016; P. Shin & Sharac, 2013). However, government incentives and legislative directives do not seem to the primary driving forces behind EHR adoption.

Reid (2016) showed that 34.6% of providers who implemented EHRs did so with the goals of increasing workflow efficiency and providing a higher quality of medical care. This is compared to 27% of health care providers who cited government regulations as the primary motivators to EHR adoption (Reid, 2016). Comparatively, Reid (2016) also found that a decrease in workplace efficiency, the opposite of the primary goal for EHR adoption, was one of the primary troublesome experiences featured by those who

described their overall experience as negative. Of the 15% in Reid's (2016) study who reported an overall negative experience, the chief concern was a lack of usability with the EHR system coupled with a lack of adequate training.

A study conducted by Jones, Rudin, Perry, and Shakelle (2012) revealed that very few physicians could meet meaningful use criteria for EHR systems. Meaningful use EHRs provide physician incentives through the Medicare and Medicaid programs in order to improve the quality of patient care (Jones et al., 2014). Starting in January 2015, these incentives turned into monetary penalties for noncompliance (Martelle et al., 2015). Only 43.5% of physicians reported have basic EHR knowledge and basic computerized skills for patient record keeping (DesRoches, Audet, Painter, & Donelan, 2013). Even more critical, less than 10% of physicians were able to meet meaningful use criteria for EHRs (DesRoches et al., 2013). Based on the findings of Shea et al. (2014), only 28.4% of physicians expressed optimism that their facility could become competent to meet meaningful use criteria. This is in contrast to 57.9% of physicians who responded favorably to altering their work routines to better support meaningful use (Shea et al., 2014).

The success of EHR design and deployment is dependent on the EHR system meeting the goals of the hospital. Adler-Milstein, Everson, and Lee (2015) conducted a qualitative study to explore three hospital outcomes related to EHR deployment: (a) adherence to procedures, (b) patient satisfaction, and (c) workplace efficiency. Using data collected from observations, interviews, and records available from the American Hospital Association and CMS (Hospital Compare and EHR Incentive Programs), the

researchers looked to see if EHR usage resulted in performance gains for the three hospital criteria.

The results of the Adler-Milstein et al. (2015) study supported a substantial increase in hospital process adherence and patient satisfaction with the quality of care (Adler-Milstein, Everson, & Lee, 2015). However, there was no meaningful improvement in workplace efficiency. This does not support the goals and expectations of HITECH and other EHR incentive programs that EHR implementation would result in lower costing, better quality health care. A contributing factor was the length of time a hospital had used an EHR. Increased and prolonged usage of EHR systems increased hospital staff expertise and resulted in an increase in meeting hospital goals (Adler-Milstein et al., 2015).

Organizational Management Strategies

Strong et al. (2014) examined the relationship between organizational management strategies and IT related initiatives, focusing primarily on EHR implementation and user satisfaction. Post EHR deployment the researchers conducted interviews. The immediate reaction to the EHR system was mostly poor (Strong et al., 2014). Some of the common concerns consisted of spending too much time using the EHR and not enough time performing other duties, such as patient care. Many physicians expressed concern that the EHR system would have a negative impact on productivity (Strong et al., 2014). There were also complaints about the design and non-intuitive nature of the interface (Strong et al., 2014). Some physicians and nurses expressed frustration with not having enough time to learn all the features of the EHR such as

medical history and family history charts (Strong et al., 2014). The provided EHR templates did not work well on patients with multiple problems.

After one year of EHR usage, the physicians and staff expressed more optimism. Most agreed that EHR implementation increased the quality of patient care (Strong et al., 2014). Other medical staff also showed satisfaction toward the EHR and agreed that it increased productivity and workplace efficiency. There were still some comments that reflected ongoing frustration, but overall, physicians and staff were much more satisfied after using the EHR system for one year (Strong et al., 2014).

The EHR system also altered workflow and general practices. Physicians were able to use EHRs to directly order medicine. This freed up clerical staff to perform other tasks, such as sorting mail and helping with physician correspondence (Strong et al., 2014). Similarly, Jerzak (2016) suggested that the majority of EHR related tasks should be handled by small teams that work with hospital physicians. This leaves physicians free to concentrate on patient care and not EHR management. In Jerzak's proposed system, physicians worked with teams of two other staff who were trained with the best practice procedures for EHRs (Jerzak, 2016).

English hospital example. From 2009 to 2010, Takian (2012) studied EHR implementation at a hospital outside of London, England. The hospital was an early adopter of Britain's new EHR system. The hospital employed a bottom-up approach, seeking the advisement of various staff members from administrative staff to medical clinicians and physicians who would be responsible for using the EHR system (Takian, 2012). Takian's (2012) case study highlighted the importance of organizational

management techniques, specifically focused training and change management, for a smooth adoption of an EHR system. Takian (2012) attributes the successful EHR implementation at this hospital to leadership and carefully planned organizational management (Takian, 2012).

Summary

Organizational management strategies can have a direct impact on technological implementation. Training and education are indicated to have a positive effect on user satisfaction rates, increased workplace efficiency, and increased EHR adoption rates among hospital staff members (Heart, Ben-Assuli, & Shabtai, 2017). The majority of hospital staff have expressed concerns over inadequate training and support when attempting to learn how to use electronic health records (Boswell, 2013). Another factor that can influence user acceptance is the flexibility of the chosen EHR system. Different types of users, both experienced and inexperienced, respond positively to a more flexible electronic system, and flexible systems provided a scalability to meet the needs of various types of health facilities (Salifu, Hafeez-Baig, & Soar, 2017; House & Mishra, 2015).

There are state-sponsored programs in the U.S. providing an incentive for hospitals to adopt a certified EHR system. In 2009, the U.S. government allocated $27 billion to health care agencies to implement EHRs (Moja et al., 2014). State sponsored financial support for EHR implementation appears to influence whether small to medium-sized health care organizations adopt EHRs (Heart, Ben-Assuli, & Shabtai, 2017). The proliferation of EHRs also has the potential of providing access to medical records for physicians and health care professionals who are in remote locations (Ajami

& Lamoochi, 2014). The benefit and financial incentive for hospitals to implement EHRs are well established, even though there are still barriers to implementation. Kohli and Tan's (2016) research suggested that management practices can impact how successfully EHRs can be integrated into health care facilities.

Transition

The literature provided a brief history of EHRs, including social needs and subsequent government incentives. The literature review provided an analysis of the complexity of EHRs, forces that influence the implementation of EHRs, incentives for deploying EHRs, and barriers that health managers encounter with EHR design and deployment.

Section Two begins with a detailed description of the study and my role as the researcher. I justify my decision to use a qualitative case study to explore EHR design and deployment and how hospital managers can leverage EHRs to meet targeted ROIs and workplace efficiency goals.

In Section Three, I provide a detail-rich description of the findings pertinent to the business problem. I give a detailed description of the four emergent themes. Additionally, I make recommendations for health care leaders to overcome barriers to EHR deployment.

Section 2: The Project

In Section 1, I provided a background to the business problem and the purpose of the research. In Section 2, I reiterate the purpose statement, followed by a description of the role of the researcher, the participants, the research method and design, ethical research, data collection instruments and techniques, data organization techniques, data analysis, and reliability.

Purpose Statement

The purpose of this qualitative single case study was to explore organizational management strategies that hospital managers can use to ensure their investments in EHRs meet targeted ROIs and work efficiency goals. I focused on a single hospital in the Northeastern United States. Data sources included semistructured interviews and archival records. I selected hospital managers with direct experience in designing and implementing successful EHRs. The results of this study may provide hospital managers with strategies for achieving targeted ROIs and work efficiency goals from EHR design and deployment. The implications for positive social change include the potential to increase the quality of patient care by providing hospital managers with increased organizational management skills.

Role of the Researcher

My primary role as the researcher was to collect data and provide a detailed analysis of the results (see Fleet, Burton, Reeves, & DasGupta, 2016). During the interview process of a case study, the researcher must ask good questions and listen without prejudice or preconceived notions (Yin, 2014). I obtained permission from the

participants to create an audio recording of the interview using a SONY digital recorder. The use of a recording device helped to ensure accuracy when the data were transcribed (see Deakin & Wakefield, 2014; Seitz, 2015).

I have experience in the fields of IT and management, and I live in the geographical area of my study. As a director of IT and former website administrator, I have been involved in projects deploying computer-based solutions. Though I have never worked at a hospital or been involved with implementing EHRs, my personal understanding of the IT field assisted me in interpreting the collected data. I did not have a vested interest in the results, and the participants were not professionally or personally rewarded.

I completed the Collaborative Institutional Training Initiative Certificate to comply with the Belmont Report. In accordance with the Belmont Report, I ensured the protection of all participants. I made all participants fully aware of any risk of participation, and I made sure that all participants were competent to make the decision to participate. All participants were supplied a consent form and were required to read and agree to the consent form before participating in my study.

It is important for the researcher to be aware of the potential for personal bias to skew and misrepresent the research findings (Patton, 2015). To mitigate bias, I followed the interview protocol to prevent my personal assumptions from interfering with data collection. I also used member checking to validate the participants' responses. I was aware of my personal assumptions and based my conclusions solely on the data. Moustakas (1994) defined the process of eliminating a researcher's personal lens as

epoché. During the interview process, the researcher must avoid injecting personal assumptions into the questions (Moustakas, 1994). I ensured that my personal prejudices did not skew the data analysis by using NVivo® 11 computer software to organize and code the data. Using computer software to organize the data and identify trends helped ensure that the data were representative of the participants' viewpoints and not my assumptions (see Oliveira, Bitencourt, Zanardo dos Santos, & Teixeira, 2016).

I collected and organized data from a purposive sample of hospital staff in the Northeastern United States who had been involved with EHR deployment. I conducted semistructured interviews using open-ended questions. Semistructured interviews are a recommended technique for obtaining firsthand experience necessary to understand a phenomenon (Yin, 2014). The use of semistructured interviews assists researchers with providing a flexible and controlled environment for data collection (Deakin & Wakefield, 2014; Seitz, 2015). Qualitative research can create a conceptual map for better comprehending a business problem (Neumann, 2014). The interview process is an appropriate means for extracting information about managerial patterns and styles (Mukhopadhyay & Gupta, 2014). The quality of the information gathered from interviews often depends on the quality of the questions. I used 10 open-ended interview questions. Open-ended interview questions, which usually begin with *why* or *how*, are the most appropriate to elicit detailed responses (Yin, 2014).

Participants

The participants for this qualitative single case study were selected from hospital managers at a small-size hospital in the Northeastern United States. I obtained my

primary data by using a semistructured interview technique. I ensured that the semistructured interviews were conducted with people who had been involved with the hospital's EHR system at various levels. The core group of interviewees was managerial-level hospital staff responsible for the selection, implementation, and maintenance of hospital information systems.

Initially, I sought the assistance of the chief information officer of the chosen hospital for the names and contact information of potential participants. I also contacted the human resources department to help me identify potential participants and to assist with contacting the participants. Participants had to meet one of the following criteria: (a) an IT manager responsible for the technical implementation of an her system, (b) a manager responsible for purchasing and technology innovations, or (c) a general hospital manager involved in the design and implementation of an EHR system. I contacted participants by e-mail and telephone to determine their willingness to participate in the study. Participants were assured verbally and in writing that their participation would be kept safe and confidential. Developing trust establishes a conducive atmosphere for the exchange of information (Haahr, Norlyk, & Hall, 2014; Hauer et al., 2015). To build trust, I employed an ethic of care approach that involved being responsive and empathetic (see Linsley & Slack, 2013). Using the ethic of care approach, I connected with the participants through reciprocal communication and adhered to ethical standards during my interactions.

Research Method and Design

Research Method

I used the qualitative method for this study. Qualitative methods are the popularly used research methods in behavioral and management sciences (Mukhopadhyay & Gupta, 2014). Qualitative research methods are viable research methods in the field of information science and technology (Hyett, Kenny, & Dickson-Swift, 2014). The qualitative approach was more appropriate than quantitative or mixed methods because the purpose of the study was to understand health care business leaders' perspectives and approach to designing and implementing EHR systems. Quantitative and mixed-method approaches were not suitable for my study because I did not examine the relationships or differences among variables (see Ridder, 2017). Qualitative research is better suited for interpretive studies (Mukhopadhyay & Gupta, 2014). Because of the ever-changing nature of information science, qualitative research can provide an in-depth perspective on various phenomena in the field, making the qualitative approach ideal for my research study (see Yazan, 2015). Freeman et al. (2015) expressed optimism that applying qualitative methods can expand a researcher's understanding of multiple phenomena. Researchers employ qualitative methods to better understand a phenomenon that is not purely data driven (Fleet et al., 2016; Neumann, 2014). Through qualitative analysis, a researcher can provide a visual map of the complexities of a business problem (Neumann, 2014). Given the multiple methods available for qualitative research, qualitative inquiry presents a research climate that is open and inclusive (Freeman et al., 2015).

Research Design

I used a single case study design for this study. There were several designs available for my research. Case studies are becoming a preferred research design in the social sciences. A case study enables researchers to identify and explore different issues for a set of distinct circumstances through numerous sources of evidence (Yin, 2014). Using a single case study allowed me to focus on one hospital and explore the different sets of processes that influence EHR implementation success. One of the advantages of using a case study is the researcher's choice of multiple sources of data (Yin, 2014). As the primary data source, semistructured interviews provided facts and insights into EHR implementation (see Mojtahed, Nunes, Martins, & Peng, 2015). The secondary data source was the publicly available archival records for the hospital. As Yin (2014) advised, I obtained pertinent archival records from available organizational records and Internet research. Because of the appeal of multiple sources of evidence, case studies are becoming a preferred research design in the social sciences (Turner & Danks, 2014). Because a case study involves exploring behavior in a natural setting, many researchers argue that case studies have solid real-world implications (Turner & Danks, 2014).

All qualitative designs have strengths and weaknesses. Grounded theory research is applicable for creating and advancing a theory (Lewis, 2015; Lokke & Sorensen, 2014). Researchers use narrative designs to understand participants' life stories and their relationship to the world (Lewis, 2015; Mukhopadhyay & Gupta, 2014). An ethnographic design would be the best choice for uncovering cultural patterns to better understand group behavior (Lewis, 2015). Although most qualitative designs provide researchers

with a deeper understanding of a phenomenon through descriptive analysis (Mukhopadhyay & Gupta, 2014), a single case study was the most appropriate design for this study.

Data saturation is a concern for any type of study. Data saturation is obtained when the researcher is no longer able to extract new information (Fusch & Ness, 2015). According to Frels and Onwuegbuzie (2013), data saturation occurs when an adequate sample size is able to provide coverage of the desired topic. I was able to obtain data saturation with the participant interviews and archival research. My use of two data sources helped me to bridge any gaps in the data that emerged from the interview process and further assisted with data saturation (see Bekhet & Zauszniewski, 2012; Houghton et al., 2013).

Population and Sampling

To obtain the correct participants for my study, I used criterion sampling. Patton (2015) defined criterion sampling as a selection process based on a predetermined set of characteristics. This strategy of selecting the participants with the correct experience with deploying and designing EHRs helped me to ensure that the participants' experiences aligned closely with the purpose of the study (see Frels & Onwuegbuzie, 2013; Lewis, 2015). Because I was only interested in the impact of managerial techniques in relation to EHR implementation, a random sample strategy would have been impossible (see Huang & Liu, 2015; Mazurenko, Zemke, Lefforge, Shoemaker, & Menachemi, 2015).

Using criterion sampling limited the number of participants. There is no set number of required participants in a single case study (Yin, 2014). Most published case

studies include more than 10 and fewer than 20 participants (Marshall, Cardon, Poddar, & Fontenot, 2013). According to Frels and Onwuegbuzie (2013), data saturation occurs when an adequate sample size is able to provide coverage of the desired topic. Data saturation can be achieved in some qualitative studies before 15 interviews (Simeone, Salvini, Cohen, Alvaro, & Vellone, 2014). Five to 15 interview participants, along with archival records, was an adequate number of interviewees to cover the experience of EHR design and deployment and achieve data saturation.

Ethical Research

I began collecting data after receiving approval from Walden University's institutional review board (IRB). Walden University's approval number for this study is 02-28-17-0469149. Participant selection, data collection, and data storage were all conducted in accordance with IRB standards and procedures. I ensured the ethical protection of participants and protected any confidential information that I collected during my study. All data collected pertaining to the participants or the organization will be stored on an encrypted hard drive for 5 years. Moreover, any printed information will be stored in a safe for 5 years. I have sole access to the safe and the hard drive. Leong, Bahl, Jiayan, Siang, and Lan (2013) advised researchers to clear the data from all devices before disposal to ensure that no identifying data can be retrieved. After 5 years, I will use Microsoft's Diskpart® utility to zero out the hard drive, and I will discard the device after I have verified that it is clear of all data.

I obtained permission to conduct research at the chosen facility through the hospital's Research Subcommittee of the Care Management Committee (See Appendix

C). All participants were provided with informed consent forms before agreeing to participate in the study. The prepared consent forms provided the potential participant with a brief overview of the study and their expected contributions. My recruitment techniques promoted voluntary inclusion in the study with no coercion or incentives. Potential participants could address any concerns, conflicts of interest, or confidentiality problems before agreeing to participate. Additionally, participants were informed that they could withdraw from the study at any time by providing either a written or verbal notification, and they were free to refuse to answer any of the interview questions for any reason.

I took the appropriate steps to minimize any risk to the participants. All data collected pertaining to the participants or the organization will be stored on an encrypted hard drive for 5 years. The hard drive is in my sole possession, and I will store it in a locked safe. Leong et al. (2013) advised researchers to clear the data from all devices before disposal to ensure that no identifying data can be retrieved. I will use Microsoft's Diskpart® utility to zero out the hard drive, and I will discard the device after I have verified that it is clear of all data. Dawson (2014) recommended confidentiality to protect the participants. Identifying information, such as full names, are not published in the study, and I did not provide any information that can be used to link or identify the participants. I used a coding system to mask the participants' identities, such as Participant 1, Participant 2, and Participant 3.

Data Collection Instruments

I conducted audio recorded semistructured interviews to collect data on designing and deploying EHRs. The semistructured interviews consisted of 10 open-ended questions (Appendix A). I conducted the interviews in person and over the telephone. In order to ensure that the collected data aligned with the research question, I closely followed the interview protocol (Appendix B).

The semistructured interviews were the primary data source. As Yin (2014) recommended, I used a recording device to help ensure accuracy when the data was later transcribed. A semistructured interview technique was chosen over a more rigid format because fluid interviews increase the depth and amount of data obtained (Randle, Mackay, & Dudley, 2014; Turner & Danks, 2014; Yin, 2014). I chose to use a semistructured interview technique for the flexibility. During the interviews, I would often validate participants' responses. Moreover, after the interviews were transcribed I provided a transcript to the interviewees via email to ensure that I accurately transcribed their replies. This process provided the participants a chance to clarify or correct any discrepancies (Fusch & Ness, 2015; Lewis, 2015). As the primary data source, the semistructured interviews provided facts and insights into EHR implementation. The secondary data source will be the hospital's archival records. As Yin (2014) advised, I will obtain pertinent archival records from available organizational records and Internet research.

Data Collection Technique

I conducted semistructured interviews for my primary data collection. The interviews were conducted in person at the hospital and over the telephone. I obtained permission from the participants to create an audio recording of the interview using a SONY® digital recorder and transferred to a PC using Audacity® software. The use of a recording device is a technique to help ensure accuracy when the data are later transcribed (Deakin & Wakefield, 2014; Seitz, 2015).

I used two techniques for member checking to ensure data accuracy. For immediate member checking, Ibrahim and Edgley (2015) recommended using reflexive analysis through paraphrasing during the interviews. By paraphrasing the respondent's answers back to him/her during the interview, I ensured that I understood their responses. After the interviews were completed and transcribed, I provided the interviewees with a transcript of the interviews via email and allowed them to clarify or correct their responses. Allowing participants to clarify their replies increases data accuracy and helps increase data saturation (Randle et al., 2014). If necessary, I was willing to scheduled follow-up interviews to clarify any discrepancies. Fusch and Ness (2015) agreed that providing the interviewees an opportunity to review and correct the transcribed interviews increases data accuracy.

The data collection technique for the archival records primarily consisted of Internet research on public websites, such as www.ahd.com. Public organizational records and reportable statistics are often used in case studies to provide data to complement the face-to-face interviews (Yin, 2014). The advantage of using two sources

of data is that it increases the validity of the findings (Yin, 2014). The disadvantage of using two sources of data is that it is time-consuming (Denzin, 2012).

Data Organization Technique

I transcribed all the interviews into Microsoft Word® documents and an NVivo® 11 compatible documents. I paid for the transcription through a company called TranscribeMe. The TranscribeMe service automatically uploads the transcripts to NVivo® 11, which I then used to organize the interview data into a structured system. NVivo® is a powerful software tool designed to aid researchers in coding raw data. NVivo® is useful for helping the researcher locate patterns and isolate inconsistencies in the data (Oliveira, Bitencourt, Zanardo dos Santos, & Teixeira, 2016). Use of the software also allows the researcher to apply filters to the data which can benefit the analysis (Oliveira et al., 2016). Utilizing NVivo® I developed a project codebook and analysis nodes to help me summarize and organize the data from the interview questions (Bradley, Getrich, & Hannigan, 2015).

I took the appropriate steps to minimize any risk to the participants, including protecting their identities. My study did not put the participants at risk of any physical harm. It is standard practice in academic research to ensure the anonymity of sources and to protect the identity of participants (Dawson, 2014). All data collected pertaining to the participants or the organization is stored on an encrypted hard drive for 5 years, and the hard drive will be stored in a locked safe. Moreover, any printed information is stored in a locked safe for an equivalent 5 years. Leong, Bahl, Jiayan, Siang, and Lan (2013) advised researchers to clear the data from all devices before disposal to ensure that no

identifying data can be retrieved. I will use Microsoft's provided Diskpart.exe utility to zero out the hard drive, and I will discard the device after I have verified that it is clear of all data. Identifying information, such as full names, is not published in this study and I did not provide any way of linking the participants to the study. I used a coding system to mask the participants' identities, such as Participant 1, Participant 2, and Participant 3.

Data Analysis

Using NVivo® 11, I cataloged and group the raw data. I subsequently ran word search and word frequency reports in order to organize the raw data into themes. I then applied generated linked searches and synonym identifiers to the data based upon consistent data components. I further used NVivo® 11 to assist me with checking the data for identifiable themes. Oliveira et al. (2016) explained that by utilizing NVivo® software, the researcher is able to uncover themes for data analysis. After the themes were saved into Nodes with aligning words and phrases, I used NVivo® to generate charts and graphs for a visual component.

Collecting the data from two sources allowed me to apply convergence. The different data sources, interviews, and archival records, were analyzed together. Data triangulation is a corroboratory strategy where the researcher attempts to support their findings using more than one data source (Patton, 2015; Yin, 2014). The multilayered approach for data collection allows the researcher to develop and validate common themes (Cronin, 2014). Data triangulation can help bridge gaps in the data that may emerge from the interview process and strengthen data validity (Bekhet & Zauszniewski, 2012; Yin, 2014). Soltes (2014) posited that archival data can be used to validate and

clarify data from other sources. I incorporated the archival data with the field data that I obtained during the interviews for data triangulation. The second data source helped me to bridge any gaps in the data that emerged from the interview process and further assisted me with obtaining data saturation. Other forms of data triangulation were not appropriate for my study. Investigator triangulation would have required another researcher to assist me in data analysis, and theory triangulation applies to studies that involve more than one conceptual perspective (Yin, 2014).

I used coding to identify, categorize, and organize themes. Nuemann (2014) suggested that coding data in qualitative research helps the researcher form a visual map. Utilizing the NVivo® software allowed me to cross-reference various themes that might not be apparent if I was manually checking the data (Oliveira et al., 2016). Researchers recommend coding as the primary source used to collect themes and perform data analysis (Mazurenko, Zemke, Lefforge, Shoemaker, & Menachemi, 2015). During the data analysis process, I continually researched and conducted literature reviews in order to uncover any new studies that had been published since the commencement of my research.

I utilized TAM as the conceptual framework for my study. I employed TAM theory to organize and analyze the data collected and included an analysis of this in my presentation of the findings. Researchers have utilized TAM as a conceptual model in various research fields. The model is fluid enough to apply to any new technology and it has a cross-cultural application (Mpinganjira, 2015; Olasina, 2015). Employing a theory of technology acceptance, such as TAM, can help researchers understand the factors of

deploying and integrating new technologies (Venkatesh, 2013). Moreover, the use of TAM can assist researchers in understanding technology usage and with evaluating the outcome of deploying new technology (Brown, Venkatesh, & Goyal, 2014).

Reliability and Validity

In a qualitative case study, it is important to address reliability and validity. Erlingsson and Brysiewicz (2013) identified four approaches for evaluating qualitative research, including (a) dependability, (b) confirmability, (c) transferability, and (d) credibility. Since I was not doing a quantitative study, internal and external validity are not relevant measures of validity (Lewis, 2015; Yazan, 2015).

Reliability

To demonstrate dependability, I used member checking and showed that my findings are consistent with the data. Each step in my research was detailed and presented, including how I obtained the data and how I analyzed the data. Frels and Onwuegbuzie (2013) posited that the researcher demonstrates dependability through precise documentation of data collection and data organization, and by member checking the data analysis. Researchers should explain their choice of design, research process, and data collection instruments in order to ensure dependability (Morse, 2015; Moustakas, 1994). My detailed description should provide other researchers enough information to repeat my study in a different health care setting or a different geographical location.

Validity

Credibility. Credibility helps ensure the trustworthiness of the researcher's conclusions (Fusch & Ness, 2015). In order to ensure the credibility of my study, I used

data triangulation and member-checking. In addition to semistructured interviews, I made use of archival records obtained through Internet research. My collection of multiple data sources helped me to bridge gaps in the data that emerged from the interview process and increased data saturation (Bekhet & Zauszniewski, 2012; Erlingsson & Brysiewicz 2013). Moreover, I used member-checking to assure that I accurately recorded the data. The use of a recording device helps ensure accuracy when the data are later transcribed (Yin, 2014). During the interviews, I routinely used reflexive analysis through paraphrasing. By paraphrasing the respondent's answers back to him/her during the interview, the researcher ensures that they understand the responses (Ibrahim & Edgley, 2015). After the interviews were completed and transcribed, I provided the interviewees the transcript via email to ensure that I accurately transcribed their replies. This process provided the participants a chance to clarify or correct any discrepancies (see Fusch & Ness, 2015; Lewis, 2015). If necessary, I was prepared to schedule follow-up interviews to clarify any discrepancies. Fusch and Ness (2015) agreed that providing the interviewees an opportunity to review and correct the transcribed interviews increases data accuracy.

Transferability. Transferability is the criterion for how applicable the researcher's conclusions are in other fields of inquiry (Erlingsson & Brysiewicz, 2013). Moreover, rich descriptions of the context of the study strengthen transferability for researchers performing similar studies in different locations (MacNaughton, Chreim, & Bourgeault, 2013). I provided a detail-rich description of the participants' experiences with designing and deploying EHRs. Turner and Danks (2014) posited that researchers should select information-rich settings and thick descriptions of the context. The single

hospital and the hospital managers provided an information-rich setting for the study of EHR deployment. The selection of an information-rich setting is vital for the researcher to be able to provide thick descriptions (Morse, 2015).

Confirmability. A researcher must demonstrate an unbiased and objective approach in order for the study to be confirmable (Ibrahim & Edgley, 2015). I addressed confirmability by keeping a reflexive journal that contained my personal biases and preconceived notions. Ibrahim and Edgley (2015) recommend the interviewer keep an account of their thoughts during the data collection process to expose biases. Furthermore, other theorists recommended that researchers keep a reflexive journal from the outset of the study in order to monitor and disclose personal bias (Anney, 2014; Hietanen, Sihvonen, Tikkanen, & Mattila, 2014).

Data triangulation is a corroboratory strategy that includes more than one data source (Patton, 2015; Yin, 2014). I attempted to support my findings using more than one data source. The multilayered approach for data collection allows the researcher to develop and validate common themes (Cronin, 2014). Data triangulation can help bridge gaps in the data that may emerge from the interview process and strengthen data validity (Bekhet & Zauszniewski, 2012; Yin, 2014). Soltes (2014) posited that archival data can be used to validate and clarify data from other sources. Denzin (2012) also suggested a multidata approach to increasing confirmability through data triangulation. I incorporated the archival data with the field data that I obtained during the interviews for data triangulation.

Data Saturation. Data saturation is obtained when the researcher is no longer able to extract new information (Fusch & Ness, 2015). According to Frels and Onwuegbuzie (2013), data saturation occurs when an adequate population size is able to provide coverage of the desired topic. I obtained data saturation with the participant interviews and archival research. My use of two data sources helped me to bridge any gaps in the data that emerged from the interviews and further assist with data saturation

Transition and Summary

The aim of my qualitative single case study was to explore the organizational management strategies that affect successful EHR deployment. I collected data from a single hospital through semistructured interviews and archival research. The participants consisted of a criterion sample of hospital managers and IT professionals who had been involved in the design and implementation of the hospital's EHRs. The data collection was semistructured interviews and archival research. Data analysis was in the form of coded themes and I used NVivo® software to organize the data. Credibility is crucial for a qualitative case study (Yin, 2014). Establishing valid and reliable data was a priority for me. Moreover, I ensured the privacy of all participants by protecting and storing the data I collected, and it will be kept for five years in a locked safe. After five years, I will use Microsoft's Diskpart® utility to clear the data and I will then dispose of the storage device.

In Section Three, I provide a detail-rich description of the findings pertinent to the business problem. I give a detailed description of the four emergent themes. Additionally,

I make recommendations for health care leaders to overcome barriers to EHR deployment.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this qualitative single case study was to explore organizational management strategies that hospital managers can use to ensure their investments in EHRs meet targeted ROIs and work efficiency goals. The participants in this study included staff members from a small hospital in New England. The hospital used three different EHR systems. The primary data collection methods for the case study included face-to-face interviews and one telephone interview. The findings demonstrated existing impediments to EHR implementation and adoption as well as organizational management strategies for overcoming these barriers. The most prominent obstacle to EHR integration was the lack of ongoing training and technical support. In Section 1, I presented the background of the study. In Section 2, I detailed how I proceeded with data collection and data analysis. In Section 3, I present my findings and discuss the application of my study for professional practice. I also provide implications for social change, recommendations for future research, reflections on the study, and a conclusion.

Presentation of the Findings

The overarching research question was the following: What organizational management strategies do hospital managers employ to ensure their investments in EHRs meet targeted ROIs and work efficiency goals? Four emergent themes were identified from the data analysis: (a) training, (b) the role of organizational management, (c) technology barriers, and (d) ongoing support and maintenance.

The most prominent emergent theme was training. The hospital managers who were interviewed mentioned training (or a synonym) 57 times. The hospital managers employed a dashboard application to measure and track targeted ROIs and work efficiency goals. There were 48 references made to the dashboard system in terms of measurements and systems tracking, which were related to overcoming technological barriers. The dashboard tool was often mentioned in conjunction with the management strategies and the planned ongoing maintenance and support. Participants mentioned the dashboard 18 times in reference to the system as a tool for behavioral metrics, which equates to the role of organizational management strategies.

Most responders talked about EHRs in positive terms. During the interviews, EHRs were mentioned frequently, and 52.64% of the mentions denoted a positive experience, specifically increasing work efficiency and increasing the number of billable hours recorded. Abdel-Rahman et al. (2016) stated that EHR system adoption benefits included (a) operational improvements, (b) workplace efficiency, (c) documentation accuracy, and (d) increase in productivity.

The negative responses to EHR implementation involved longer than usual documentation processes, system usability or incompatibility issues, and increase in work time. Participants' negative responses to EHRs accounted for less than 40% of the overall EHR references. The most prominent complaint was that the current EHR system did not interface with other EHRs that the responders were required to use or work with, and that the staff did not have adequate training to overcome this technological difficulty.

Theme 1: Training

One of the pervasive barriers to successful EHR implementation is the lack of proper staff training or the limited availability of adequate training. Resistance to new technology can stem from a lack of awareness of the benefits of the new technology and a lack of proper training on how to use the technology (Kohnke et al., 2014). Reid (2016) reported an overall negative experience with EHR adoption, and the chief concern was a lack of usability with the EHR system coupled with a lack of adequate training. In the current study, the interview participants talked about training a total of 40 times.

Participant 1 and Participant 2 mentioned additional training as something they would add if they were able to. Participant 3 mentioned training as something that assisted the EHR rollout and made it easier for the end users. Of the 57 references to training, five references were negative. The negative responses referred to the training being offsite and the trainers not being available for ongoing support. A summary of Theme 1 responses is presented in Figure 2.

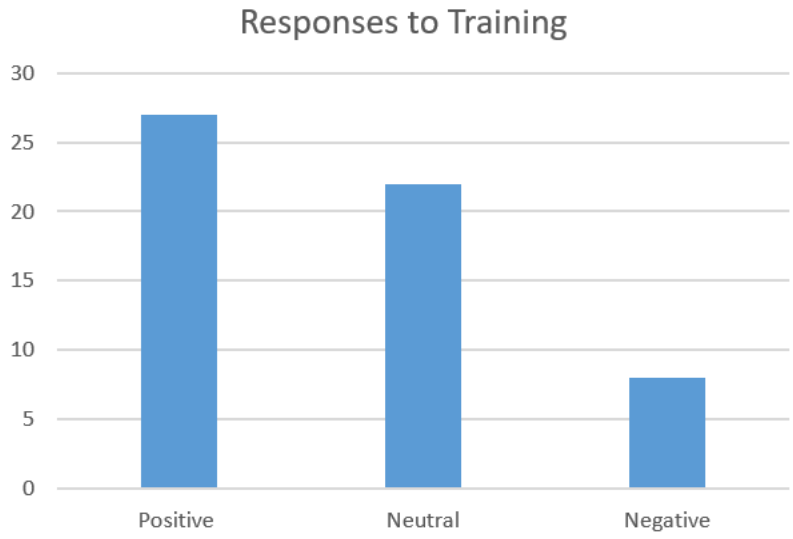

Figure 2. Responses to Theme 1.

Another matter of contention regarding training was the lack of focus of the trainers on pertinent issues. The trainers appeared to not know the audience or their particular needs. Instead, the trainers offered a more generic training that was not always relevant to the trainees' type of work. One respondent described how the training focused on a type of health care EHR that was not used at their hospital.

This theme was consistent with findings from other studies. Mason (2015) noted that participants acknowledged a need for additional training beyond the initial guide. Slight et al. (2014) identified training as a key factor in determining EHR cost and for operational planning.

The availability of guidance and training when using new technologies also relate to the TAM. Primary motivating factors for acceptance of new technologies include users' perceived ease of use (Poh-Ming et al., 2014). Kohnke et al. (2014) suggested that managers could reduce user anxiety and increase user efficiency by the inclusion of

focused training. Training not only provides new technology users with practical knowledge, training also provides a demonstration of how a new technology would be useful for the performance of a job (Chia-Ying, 2015). Additionally, the user's perceived readiness to use a new technology affects performance outcomes and overall user satisfaction (Tong et al., 2015).

Not all of the feedback on training was negative. One respondent described the training as helpful and fulfilling the initial needs for using the new EHR system. The hospital managers made an effort to increase training during the implementation process. The hospital reported an overall increase in training expenses of 1.2% from the previous year in conjunction with implementing a new EHR. Training can enhance user familiarity with new technology. Hands-on training can serve as an effective means of providing user proficiency and increasing user acceptance (Solaja & Ogunia, 2016).

The participants' testimonies included the following:

- "I know personally one of my goals was to attend the training that was offered. We did have to go to New Britain, which was inconvenient" (Participant 2).
- "A lot of the time during that training, the trainees were focused on medical health records versus behavioral health. We're a behavioral health institute" (Participant 2).
- "And so that made the rollout much easier, the training and the support much easier" (Participant 4).

Theme 2: Role of Organizational Management Strategies

Related to personnel and training was the role of organizational management strategies. This theme was more difficult to tease out of the raw data. This theme showed up in the word query searches under terms such as *strategy* and *management*. I did an additional search for these terms in relation to behavioral management or management strategies. I had to remove all of the occurrences of *behavioral* that related to a behavioral health unit or facility.

Another term related to this theme was *strategy* or *strategies*. This word was used 13 times and usually in reference to designing and deploying the EHR. Twice the term was used to denote a lack of strategies. The other times it related to how strategies were employed to design and distribute the new EHR system. Another use of strategy was the prevalent dashboard application that was employed to help manage the project.

Typically, when *behavioral* and *management* were used in conjunction with some type of strategy, it involved meetings and planning sessions. Figure 3 shows a word tree for the occurrences of management within this context. The interviewees often discussed groups of decision-makers such as steering committees in a positive light, demonstrating that these groups were understood to help the implementation. This was also emphasized by the use of positive terms such as *successful* and *resolve* after the occurrence of management meetings and projects. A summary of Theme 2 responses is presented in Figure 3.

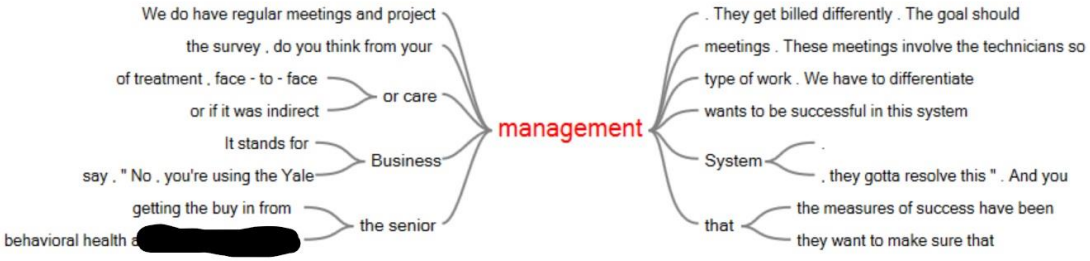

Figure 3. Word tree for Theme 2.

The final key word related to the theme was *steering committee*, which was mentioned by five of the six participants. This committee continues to exist even after the EHR rollout and examines any issues that arise in production. The participants spoke well of this committee in that members were decision-makers with the authority to correct problems quickly. The tool that was used to assist with organizational management strategies was a dashboard feature that allowed managers to track workflow and identify problems.

The literature review I conducted supported the finding that organizational management strategies can have a direct impact on technological implementation. Training, education, and direct management involvement are indicated to have a positive effect on user satisfaction rates, workplace efficiency, and EHR adoption rates among hospital staff members (Heart et al., 2017).

This theme was also closely related to the conceptual framework of the TAM. Close managerial involvement along with measurable goals support successful technology innovation (Kohnke et al., 2014). Similarly, Jerzak (2016) suggested that most her-related tasks should be handled by small teams that work with hospital

physicians. This leaves physicians free to concentrate on patient care and not EHR management. In Jerzak's proposed system, physicians work with teams of two other staff who are trained with the best practice procedures for EHRs.

The participants' responses related to Theme 2 included the following:

- "We do have regular meetings and project management meetings. These meetings involve the technicians so that we can see what [the EHR] can and cannot perform" (Participant 5).
- "And that committee, because of its makeup, has the executive on it that an either A, make the decision right there in that committee about whatever the groups were struggling with, or they have the power to walk out of that committee meeting and make sure that the decision gets made. So having that steering committee was a great way to break down the barriers of things that we needed to do to implement" (Participant 4).
- "We did have some measurements, and we did those basically with dashboarding after the go-live" (Participant 2).
- "So those are the types of things we looked at, and the tool we used was the dashboard reporting system to make sure that the implementation went smoothly and that if we saw flags in any areas, we would check on what the root cause during the implementation was to see if we could correct what was going on" (Participant 6).

Theme 3: Technological Barriers

During the interviews, participants often discussed technological barriers to the successful use of the new EHR systems. The technical discussions centered around making sure the existing hospital infrastructure supported the EHR. This was reflected from both a managerial as well as a client-side concern.

Technological issues had the potential to impede or halt the EHR deployment project. During the planning stages, every part of the current IT structure was examined for compatibility. This included wireless networks and network throughput, printers, scanners, PC models, and available network access. Incidents still occurred during deployment, but management reported being better able to respond to these problems due to the preplanning and established steering committees. The participants mentioned *barrier* or *barriers* 20 times. Fifteen of the references were in reference to technological barriers, as shown in Figure 4.

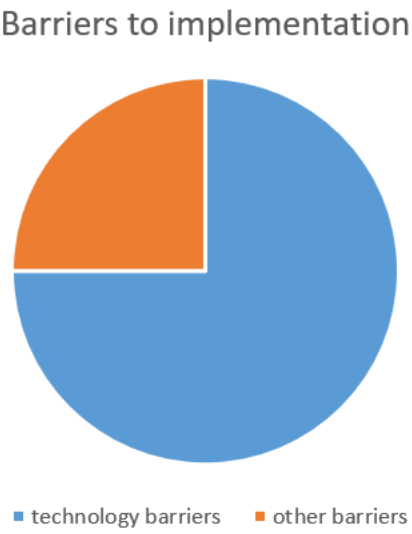

Figure 4. Frequency of technology barriers.

The hospital planned for and dealt with these technological barriers by applying training and establishing workgroups that monitored deployment technology issues. The workgroups made use of a dashboard application that helped them track performance across disciplines and departments. This approach is supported by other studies in the literature review. Change resistance barriers and technological barriers can be related to a lack of organizational management support in the areas of training and education (Cortez, 2014; Mason, 2015). The planners decided to invest early in planning and deployment strategies. This appears to help alleviate some of the technical barriers. The success of an EHR system depends greatly on the investment, both initial investment and commitment to maintenance, and on the correct usage of the EHR system (Gagnon et al., 2016; Kruse et al., 2016).

This theme has close relations with the TAM conceptual framework. Technological barriers were mitigated through technology as well as organizational

management strategies. As Kohnke, Cole, and Bush (2014) discovered, hospital managers can reduce user anxiety, improve technology acceptance rates, and increase user efficiency goals by incorporating an acceptance model with the deployment of health care technology.

The interview participants said the following:

- "Basically, what we ended up doing is talking to people and saying, "Look, go with the-- use this form. Let's get it all implemented. And then six months down the road, if there's any tweaks needed or any modifications, we'll make them at that point in time" (Participant 1).
- "So what they do with Epic, is they do what's called a technical dress rehearsal, and what that means is they go to each site, they look at all of that infrastructure, they look at every device that's going to attach to Epic in any way, and they make sure that everything is A, up to the standards, and B, actually does make the appropriate connections that it's supposed to do in dress rehearsal" (Participant 2).
- "Another barrier is that its real time. So if you don't change the data or the time of any kind of note or any documentation it would register as in the time that you started filling it out" (Participant 3).
- "We provided off site training that addressed the technical needs. Then we provided onsite personnel who addressed individual needs, like making sure people could get into the system and reset their passwords" (Participant 5).

Theme 4: Ongoing Support and Maintenance

During the interviews, participants reflected upon the need to maintain, repair, and perform upkeep on the EHR system. This technical concern was represented ambivalently with both optimism and apprehension. The optimistic prognostics centered around having a good plan and method in place from the implementation phase. The apprehension usually involved a lack of personnel and resources. The following word tree shows the relationship between support and the types of support the participants talked about.

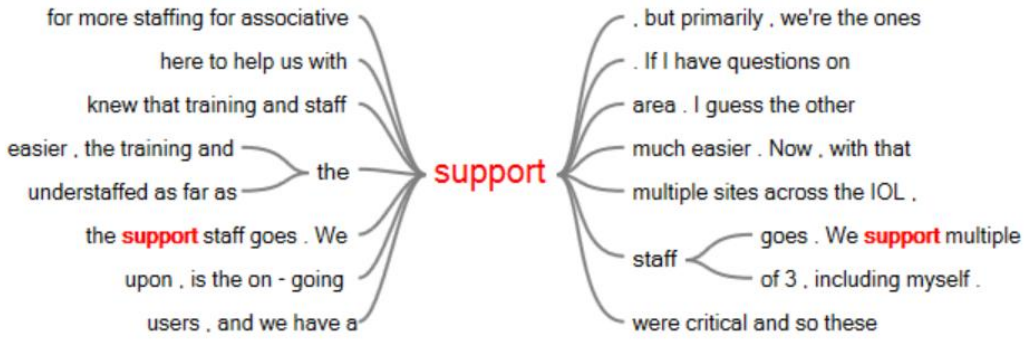

Figure 5. Word tree for theme 4.

One of the participants stated that the support team had dwindled significantly since the initial deployment phase. This person expressed concern that there were not enough technical employees to properly respond to issues that may arise. Another interviewee discussed using the same methods as were employed during implementation

to assist them with timely fixes for any problems, but that those problems would need to be identified promptly.

The literature discussed the impact over time of EHR usage. Increased and prolonged usage of EHR systems increased hospital staff expertise and resulted in an increase in meeting hospital goals (Adler-Milstein et al., 2015). This long-term benefit cannot be realized if the EHR system is not properly patched and maintained. There is also the concern of keeping up with security risks and making sure any electronic access is secure. Patients have a right to a secure and protective medical records system, and this security is guaranteed by the HIPAA act (Rhoda & Brown, 2017).

This theme also relates to the conceptual framework. Ongoing support and training can help ease staff into the proper usage of the EHR system, and this support can make them more productive (Tong et al., 2015). This support is helpful to those who may not be technically proficient. Support and knowledge can help mitigate some the barriers for technology resistant users (Tarhini et al., 2015). If the proper ongoing support is not provided, this can increase user anxiety and make them more resistant to using the new technology (Kohnke et al., 2014). Hands-on training can serve as an effective means of providing user proficiency and increased user acceptance (Solaja & Ogunia, 2016).

The participants' testimonies included:

- "Basically, [concerning ongoing risks] as you probably are aware, as you start to build a system, there's a tendency to keep adding things to it, but you never get rid of things" (Participant 1).

- "Now, we do tap into some of our other programmers that we have here to help us with support, but primarily, we're the ones that are on the front line and doing that" (Participant 1).
- [regarding tech support frustrations] "When there is problems, knowing who to go to to resolve it. Particularly with BMS, we've had this reoccurring thing where if you have a problem with it, you call to ----, and they say, "No, that's something you gotta go to your IT department at your own agency." And you go to your own IT department and they say, "No, you're using the ---- business management system, they gotta resolve this". And you go back and forth until they both finally get on the phone and talk to each other and it's either mutual, they both have a problem, or it's one or the other" (Participant 3).
- "And where the barrier came is not just in getting all the subject matter experts identified to be able to work on it, but also ensuring that those subject matter experts would come back with timely information" (Participant 4).

Applications to Professional Practice

Meyerhoefer et al. (2016) proposed that the delay in meeting ROI targets after EHR implementation was due to the increased work adapting to new work practices and the need for technical training. Heorbst and Schweitzer (2015) stressed the importance of organizational strategies and user focused training as ways to mitigate the barriers to EHR adaption. Most of the participants in this study affirmed that (a) training, (b) organizational management support and strategies, (c) alleviation of technological

barriers, and (d) ongoing managerial support helped alleviate the barriers to successful EHR implementation.

The findings of this study will add and contribute to the existing knowledge regarding organizational management practices for successful EHR system design and implementation. The case study was conducted at a hospital in the northeastern United States, but the results are applicable to other territories and other health care facilities. Moreover, the results may be applicable to other technology initiatives that are designed to improve workplace efficiency and reduce costs. The identified themes may provide additional knowledge into the barriers for concerning the introduction of EHR systems into the health care industry. When successfully adopted, EHRs have the potential to increase workplace efficiency, increase the quality of patient medical care, and reduce expenses for the hospital or health care facility (Heart et al., 2017).

Implications for Social Change

The results of the study may assist health care leaders to increase the quality of patient care through a better understanding of how best to design and implement EHR systems. By contributing to the body of knowledge regarding EHR adoption, I hope that my study assists hospital managers in being better prepared to adapt and manage EHRs. Increased EHR adoption allows physicians better access to patient records in order to make better decisions regarding patient care (Ajami & Lamoochi, 2014; Valentino, 2016). The results of my study may provide health care managers with access to more applicable organizational skills to better implement health care technology that will increase the quality of care for patients. There are potential social benefits from the

global implementation of electronic health records, such as assisting physicians and health professionals, who are geographically isolated, in obtaining patient records (Ajami & Lamoochi, 2014). EHRs help make other medical services available, such as telemedicine and e-prescriptions (Langabeer, Champagne, & Sullivan, 2016). These medical services may help at-risk patients, including the underinsured, underrepresented, and vulnerable patients in disaster areas (Ko, Murphy, & Bindman, 2015).

Recommendations for Action

The following recommendations for further action are derived from my research as well as the academic literature review. The recommendations are precisely for hospital managers and administrators, and in general, can be helpful for health care managers and managers from other organizations implementing EHR systems. In the broadest sense, anyone involved with implementing new technology for a user base should find some value in these recommendations.

Four themes emerged from my research: (a) training, (b) the role of organizational management, (c) technology barriers, and (d) ongoing support and maintenance. Based on these themes and the academic literature, I recommend the following for hospital managers:

1. Develop a team of upper-level management (decision makers) that can act as a steering committee for the project and post-implementation.
2. Identify key areas such as workflow processes and critical endpoints, prior to implementation.

3. The steering committee should have regular contact with key stakeholders, especially the users and the vendors.
4. Training should be provided early and often in the EHR process. Ongoing training is crucial for continued user support and user acceptance.
5. Allow adequate time for the users, especially doctors and support staff, to use the system and become familiar with it.

These recommendations could be disseminated via instructional material, such as training manuals. Alternately, these five steps could be discussed and explained during a conference devoted to EHR implementation.

Recommendations for Further Research

The health care industry and health care facilities, such as hospitals, are continuously changing and growing. If EHR systems are going to continue to be beneficial then those who manage them will need to adopt as well. I found several themes during this study that are worthy of further research. This study could be replicated in different geographical areas in the U.S. and in the world. Also, researchers could focus case studies on larger hospitals and different types of health care facilities that have adopted EHRs. Other types of studies could include observing people using EHR systems. Other areas for researchers to explore are user attitudes toward EHRs and how those attitudes might change in five years or 10 years after implementation. From a financial perspective, it would be interesting to see a quantitative study that examined how long it took before financial benefits accrued from EHR implementation.

Reflections

Ever since I first experienced electronic records as a patient in a hospital, I was fascinated how such a universal system could be implemented across a vast and complex health care industry. Going into this study I had an opinion that EHR records were more efficient than paper records, and this study has reinforced that opinion. I worked hard not to influence the participants with my opinions and encouraged them to answer open-ended questions as best they could.

I had a difficult time securing a research partner that would allow me to interview hospital managers. For six months I attempted to obtain IRB approval from local hospitals. It was through persistent contact and reassurance of participants' anonymity that I was granted permission to conduct my research at a small hospital near me.

The participants of this study helped me understand how the various stakeholders and decision makers worked together to design and deploy an EHR system. Furthermore, talking to the participants gave me a better understanding of EHR implementation barriers for a small hospital. This study would not have been successful without the voluntary participation of the hospital managers who agreed to give their time and to answer my questions.

Conclusion

Deploying and managing EHR systems is a complex and difficult task. During this study, I was able to obtain relevant information for hospital and health care leaders who are designing, implementing, or managing an EHR system. The results of this study support organizational management strategies that provide user assistance and training, as

well as ongoing support and maintenance, to help hospitals successfully implement EHR systems. The findings of this study will add and contribute to the existing knowledge regarding organizational management practices for successful EHR system design and implementation. The findings of this study can be applied to other health care technology initiatives. The findings of this study provide a basis for further research into the subject of EHR implementation and organizational management strategies. Additionally, the findings may contribute to positive social change by providing the technology for affordable and accessible health care to those in high risk populations and remote locations.

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Appendix A: Interview Questions

1. What goals did you set for your EHR system's ROI?
2. What were the project strategies for designing and implementing your hospital's EHR for achieving the targeted ROI?
3. How did you develop and deploy the strategies?
4. How did you ensure that your EHR met work efficiency goals?
5. What tool(s) did you use to measure work efficiency?
6. What barriers did you encounter in deploying and implementing the EHR system?
7. How did you address the barriers?
8. What metrics did you use to measure the success of your EHR system?
9. Based upon those performance metrics how do the current performance levels and trends compare with the goals you set for your EHR system?
10. In thinking back on EHR design, development, and implementation, what, if anything would you do differently?

Appendix B: Interview Protocol

Actions (What you will do)	Script (What you will say)
• Introduction to the study and set the stage • Let the interviewee introduce themselves	My name is Jarrod Borek. I appreciate you taking the time to participate in this interview and my doctoral study. In this study I am exploring organizational management strategies to ensure EHR investments meet targeted return on investments. I am a study at Walden University and the IT Director at Quinebaug Valley Community College. To begin I am providing you with a signed copy of your consent to participate. Do you have any questions for me regarding the informed consent? Do you have any questions or concerns about your participation, confidentiality, or your safety? I remind you that I will be recording the interview in order to ensure clarity when I later transcribe your

	responses. I will provide you with a copy of your answers. If you do not have any other questions, I will begin the interview.
• Ask the interview questions • Insert follow-up or probing questions as needed and appropriate	1. What goals did you set for your EHR system's ROI? 2. What were the project strategies for designing and implementing your hospital's EHR for achieving the targeted ROI? 3. How did you develop and deploy the strategies? 4. How did you ensure that your EHR met work efficiency goals? 5. What tool(s) did you use to measure work efficiency? 6. What barriers did you encounter in deploying and implementing the EHR system? 7. How did you address the barriers?

	8. What metrics did you use to measure the success of your EHR system? 9. Based upon those performance metrics how do the current performance levels and trends compare with the goals you set for your EHR system? 10. In thinking back on EHR design, development, and implementation, what, if anything would you do differently?
• Conclude the interview • Remind the participate of a possible follow-up interview	I will transcribe this interview and provided you with a hard copy of your answers. Please check over your responses and check for any errors. If there are any inaccuracies, I will schedule a follow-up interview. Thank you for your time.

Appendix C: Consent Letter

[redacted]

August 28, 2017

To Whom It May Concern:

Please be advised that the Research Subcommittee of the Care Management Committee at [redacted] has reviewed the research proposal submitted by Mr. Jarrod Borek and determined that it is acceptable under the research guidelines established by the Hospital. Accordingly, the Hospital will be pleased to provide Mr. Borek with access to Hospital staff for the purpose of collecting data for his research project, and we look forward to our involvement in this activity, Please, feel free to contact me should there be any questions about the Hospital's agreement to grant authorization for this research project.

[redacted]