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The Relationship Between Information Technology and Organizational Effectiveness as Perceived by Health Care Providers

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Abstract

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MA, Florida A & M University, 1996

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Abstract

The U.S. Congress has made health information technology a central component of the national quest to improve health care delivery. The problem addressed in this study was the uncertainty among healthcare providers regarding the benefits of health care information technology adoption relative to healthcare delivery processes and outcomes. The purpose of the study was to understand the effectiveness of information technology as perceived by healthcare providers. The research questions were designed to investigate the relationship between health information technology and organizational effectiveness, exchange of information, organizational process, organizational productivity, and direct personal care. Sociotechnical systems theory and Donabedian's framework for health care quality evaluation were the theoretical bases for this quantitative study. Data were provided through anonymous online survey of 116 healthcare workers, and analyzed using multiple regression and Spearman's correlation coefficient. The results of the study showed a statistically significant positive correlation between organizational effectiveness, organizational exchange of information, organizational process, organizational productivity, and healthcare information technology. No statistically significant correlation existed between personal care and health information technology. These findings suggest that providers' frequent use of healthcare information technology, like telemedicine, makes patients less involved. The implications for social change include enabling healthcare providers to develop an efficient and effective way to engage with patients, in order to achieve effective patient-centered organization.

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Dedication

This study is dedicated to my family who endured my temporary absence during this doctoral study. I thank you all for your understanding and support. To my loving wife Anthonia, thank you for being my rock and for taking care of our family so that I could focus on my studies. I love you so much. To my big brother, Professor Okechukwu Ukaga, I thank you so much. You believed in me. You did everything in your power to make sure I had the resources I needed to complete my dissertation. I will be eternally grateful to you my uncle, Professor Emeritus Soronnadi Nnaji for your unwavering support in my life and throughout this process. To my dad, His Royal Highness Eze Pius O. Ukaga (Eze Udo III of Obibi Uratta autonomous community), thank you for all your encouragement and for teaching me the value of hard work and education. To my mom, Her Royal Majesty Ugoeze Beatrice O. Ukaga for all your love and support, and for always reminding me of that saying by Alexander Pope that "A little learning is a dangerous thing; drink deep, or taste not the Pierian spring: there shallow draughts intoxicate the brain, and drinking largely sobers us again". Finally, thanks to my sons - Chidiebere, Obieze, Ekene, and Chimezirim. We missed some functions, some soccer, basketball, and or football practices. I thank you all for your understanding and love. I love you all!

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Chapter 1: Introduction to the Study

Background

Health information technology (HIT) is critical not only for local health care organizations but also for national, regional, and international health care organizations. The U.S. Congress has made investment in HIT a central component for national improvement of health care delivery (Los Angeles Care Health Plan, 2010). Health care systems in the United Kingdom are also challenged by HIT (Rosenback & Young, 2008). There are continual improvements in medical technologies, greater levels of patient awareness, and increasing demands for the variety of health care sources available within health services. Health information technology has the potential to improve health care quality, reduce health care costs, and enhance productivity. Outside of the health care sector, several researchers have documented the use of information technology (IT) and its relationship to organizational effectiveness in macroeconomic studies (Duncombe, 2011; Islam & Gronlund, 2011; Rosenback & Young, 2008; Sparks, 2014). Other researchers have demonstrated the effects of HIT through case studies focusing on a range of individual companies and hospitals (Bates & Bitton, 2010; Shields, Lewis & Oldach, 2010). Yet, investment in health care technology and its subsequent adoption remain low (Onway & Terrell, 2010).

Three major HIT applications commonly adopted in health care organizations are electronic medical records, picture archiving and communications systems, and computerized physician order entry. Some nations have yet to incorporate HIT into health services. This has been attributed to a lack of evidence regarding the contribution of HIT

to improved organizational performance, effectiveness, or positive return on investment (American Association of Family Physicians, 2010). There has been considerable research on HIT adoption and benefits since the early 2000s, yet the results do not always lead to a compelling business case for hospital boards or business leaders (Shortell, 2012). The lack of a compelling business case is particularly problematic given the multi-million-dollar investment required to purchase and install specialized HIT applications that support clinical practice. The sample of hospitals studied for the positive impacts of HIT also limits prior research in the health care sector. Researchers have indicated HIT may even lead to higher billing and declines in provider productivity (Rosenback & Young, 2008).

Health information technology is an umbrella term that encompasses several technologies including Meditech, telemedicine, iportal, iNotify, GE Centricity, and iTriage. The performance of a health care organization depends on the links among structures, processes, and outcomes (Enthoven, 2009). From a business perspective, organizations' structures have an impact on their processes, which further affect organization outcomes. The connection between organizational effectiveness and HIT remains unsettled, with many researchers unable to connect conclusions to health care organizations and providers.

In this research I attempt to bridge the gap in the available literature and reduce doubts expressed by organizational leaders and policy makers on the adoption of HIT. In this study I investigated the relationship between HIT adoption and organizational

performance with regard to its effectiveness. The second chapter contains a more in-depth discussion on previous research in order to build a foundation for the study.

Problem Statement

The ineffectiveness of organizational processes and resources resulting in low quality of health care outcomes has presented health care organizational leaders with new challenges. The specific problem addressed in this study was uncertainty surrounding the benefits of HIT adoption relative to healthcare delivery processes and outcomes. In an effort to enhance effectiveness, leaders of health care organizations have adopted various HITs to facilitate the delivery of health care services. However, the challenges faced by health care providers in implementing and assimilating HIT into their daily processes often do not allow the organizations to receive the full benefit of, and return on, their investments in HIT. These challenges associated with the implementation of HIT have direct and indirect impacts on health care delivery outcomes, as well as on the effectiveness of organizations. Researchers such as Rosenback and Young (2008), Onway and Terrell (2010), and Shortell (2012), focused on institutions that are not representative of hospitals, which made the findings somewhat irrelevant to hospitals. Bodenheimer (2010) and Enthoven (2009) reported general findings instead of clearly identifying the stakeholders affected by HIT adoption in the health care chain.

The findings within available literature addressing HIT investment and its associated benefit are debatable because potential benefits are difficult to link to specific health care organizations. Hence, some providers remain reluctant to embrace the HIT concept, while patients generally do not know enough to select one health care

organization over another based on HIT. Further, the rate of error reduction in the health care sector is still inconsistent, despite some organizations already having HIT that are supposed to help reduce medical errors. This implies that there is something wrong within the framework of HIT adoption. The problem can include inappropriate selection of a HIT system, inappropriate use of the adopted system, inadequate allocation of funds to the HIT adoption, or poor implementation of the adoption process.

Hospital executives may question whether an investment in HIT will pay off, how sizable an investment is necessary, and how long it will take to realize a return. In turn, organizational leaders may question how HIT can help them realize significant quality as well as measurable cost-related benefits. Health practitioners are concerned with how their organization compares to others and whether existing HIT infrastructure is delivering at an optimal level (Gorman, 2011; Pizzitola, 2008). These questions directly link to factors that impact the quality of health care delivery. Thus, the focus of the study was to objectively reconcile unresolved speculation on HIT adoption. The study included only current employees from a selected north Florida health care organization.

Nature of Study

The study was a quantitative correlational study. The study was designed to explore whether, and to what extent, a relationship exists between the independent variable (HIT) and the dependent variables (organizational effectiveness, organizational exchange of information, organizational process, organizational productivity, and direct personal care). Data collected through an electronic survey was analyzed to answer the above questions (Creswell, 2009; Simon, 2006).

Correlation analysis was selected as the appropriate methodology for quantifying the degree of correlation between the dependent and independent variables in the study because a causal model could not be easily determined. Causation analysis (such as regression) is difficult because of the numerous variables that may influence HIT effectiveness. Also, one survey is correlated to another, which further made regression very difficult. For instance, there may have been moderating and mediating variables.

Qualitative research approaches such as phenomenological, case study, grounded theory, and action research were considered but not judged appropriate for the study, as further explained in Chapter 3. The phenomenological method was not utilized as its focus is an individual perspective and includes individual interpretation (May, 2002). Similarly a case study was not appropriate because that would elicit interpretive responses to a particular variable relationship, and the proposed study involved many such relationships. Further, a case study would have entailed exploring causation to determine principles related to the study (Leedy & Ormrod, 2005). Grounded theory was not utilized as its objective is to generate new theories or expound on current ones using inductive methods (Creswell, 2002). Using grounded theory in the study would have required me not to argue with the findings of previous studies (Woolley, 2008). Action research method needs active cooperation between the client (HIT adopters) and the researcher, as well as continual adjustment processes (Cozby, 2009) that should be in line with the new information and responses to initiated intervention. Analytically, action research method was not appropriate in the study. This study was not about health care organizational problems, but rather how the adoption of HIT relates to organizational

effectiveness. To use the inductive approach of the field work method, researchers need to have direct and concrete experiences based on real-world observations on how HIT relates to organizational effectiveness. Against this background, correlational analysis was selected as a first step towards understanding where to focus and what variables to consider in a future causal analysis.

A series of Spearman rho correlations were conducted to assess the relationship among HIT and other variables such as organizational effectiveness, organizational exchange of information, organizational process, organizational productivity, and direct personal care. The Spearman rho is measured with the Spearman rho coefficient. Coefficient values range from negative one to positive one. Negative coefficients suggest an inverse relationship while positive coefficients suggest a direct relationship.

The independent variable in the study was HIT. Health Information Technology consists of the following set of systems: Computerizd Physician Order Entry (CPOE), Clinical Decision Support System (CDSS), Electronic Health Record System (EHR), Picture Archiving and Communications Systems (PACS), and HIT applications. The dependent variables in the study were organizational effectiveness, organizational exchange of information, organizational process, organizational productivity, and direct personal care. I explored the relationship between HIT and each one of these variables (organizational effectiveness, exchange of information, process, productivity, and personal care). Each one of these was measured separately and was included in a different correlation or hypothesis. For example, Hypothesis 1 examined the relationship between HIT and organizational effectiveness.

Organizational effectiveness is an abstract construct that is very difficult to measure. Literature on organizational effectiveness reveals a lack of consensus as to the meaning of organizational effectiveness. To understand what constitutes an effective organization as well as the link between organization effectiveness and productivity, researchers have emphasized the relationship between organizational structure, strategy, organizational roles, people systems, leadership, organizational culture and values, and employee engagement (Vilamovska, 2010). Therefore, organizational effectiveness is a situation whereby all these elements exist in harmony and support one another for the overall benefit of the organization. Organizational effectiveness was measured using the 5-facet scale of the Organizational Effectiveness Scale (OES) developed by Rotondi (1975) to measure employee effectiveness within an organization. The scale items relating to effectiveness are stability, integration, voluntarism, and achievement. See more detail in Chapter 3.

Organizational exchange of information captures the flow and direction of information within the organization. Exchange of information in organizations is multidirectional from the top down, bottom up, and across sections. Organizational exchange of information was measured using five scale items adapted from the initial 13 dimensions of the Communication Questionnaire (CQ). According to Roberts and O'Reilly (1974), the purpose of the Communication Questionnaire is to allow respondents to summarize their own communication over time. Communication Questionnaire is a 35 Likert-type item, self-report measure of respondent perceptions of communication dimensions. Communication Questionnaire scale items include trust, influence, mobility,

desire for interaction, directionality of communication, accuracy, summarization, gatekeeping, overload, satisfaction, and modalities including written, face-to-face, telephone, and other. More detail follows in Chapter 3.

Organizational processes are those workflow activities of organizational subunits that enable consistent process performance across an organization. Hylton (2013) described organizational processes as an interconnected series of tasks that are executed as the organization pursues its objectives. These tasks include the division of labor, the specialization of skills, the individual steps and decision points within the organization's operations, as well as their interrelatedness as they impact all levels of organizational operations. Organizational processes were measured using five scale items adapted from the Organizational Process Survey (OPS). The research conducted by Hylton (2013) indicated that the purpose of the OPS is to obtain an assessment of formal, documented, organizational processes and leadership behaviors relative to those processes. The OPS is a 14 item, 10 point Likert-type scale instrument. The objective is to improve the understanding of organizational leadership behaviors relative to organizational process. The results from OPS were used to evaluate organizational commitment to following processes. More detail about organizational process and the survey instrument is provided in Chapter 3.

Organizational productivity has been defined in a variety of ways. As Pritchard (1991) discovered, the term productivity has been used in various ways ranging from organizational efficiency, individual performance, cost effectiveness, production profitability, efficiency, output, and motivation, to performance appraisal. According to

Harris (1994), in the systems model of organizational performance, productivity is one of the seven interrelated and interdependent criteria of organizational performance, which also include efficiency, effectiveness, quality, profitability, innovation, and quality of work life. The Productivity Scale (PS) developed by McNeese-Smith (1995) was adapted to measure organizational productivity. The research by McNeese-Smith (1995) indicated that productivity should be measured by multiple indicators including goal attainment, cost of labor and supplies, quality of service, employee growth, hours of care per unit of service, amount of work, deadlines, work organization, errors, sick leave, turnover, and problem solving. More detail follows in Chapter 3.

Personal care describes the types of patient–practitioner relations in health care settings. The personal care or patient-centered approach focuses on collaboration, empathy, caring, shared meaning, mutual dependence, and family and patient involvement. The focus of the paternalistic or traditional approaches is on the practitioner or physician as the expert who motivates and directs patients toward compliance. According to Krupat, Hiam, Fleming, and Freeman (1999), sharing reflects the extent to which the respondent believes that (a) practitioners and patients should share power and control on a relatively equal basis, and (b) that practitioners should share as much information with their patients as possible. Caring refers to the extent respondents believe that (a) caring about emotions and good interpersonal relations is a key aspect of the medical encounter, and (b) that practitioners should care about the patient as a whole person rather than as a medical condition. Personal care was measured by utilizing five scale items adapted from Patient Practitioner Orientation Scale developed by Krupat et al.

(1999). Permission to use the instrument was granted (see Appendix A). Chapter 3 provides more information on the variables, and the measurement instruments.

To collect data, I used an electronic survey. In social science research, researchers commonly use surveys to collect data from a sample population for the purpose of generalizing findings to a larger population (Cresswell, 2009). The advantages of using an electronic survey include cost-effectiveness, time savings, and data collection efficacy. The study population consisted of practicing doctors, nurses, radiologists, and administrative staff who use health care information technologies. The basis for participant selection was convenience sampling. No demographic data was collected and no personal identifying information was collected. Data from the survey questionnaires were entered into and analyzed with Statistics Pro version V1.14.12.16. Chapter 3 provides a more detailed discussion of the research methodology, sample design, survey instruments, data collection, and analysis procedures.

Research Questions and Hypotheses

I developed the research questions based on existing doubts regarding the adoption of HIT and in line with background information. Thus, the following research questions were formulated to test the hypotheses:

Research Question 1: What is the relationship, if any, between the adoption of HIT and organizational effectiveness?

$H1_0$: There is no statistically significant relationship between the adoption of HIT and organizational effectiveness.

$H1_a$: There is a statistically significant relationship between the adoption of HIT and organizational effectiveness.

Research Question 2: What is the relationship, if any, between the adoption of HIT and exchange of information?

$H2_0$: There is no statistically significant relationship between the adoption of HIT and exchange of information.

$H2_a$: There is a statistically significant relationship between the adoption of HIT and exchange of information.

Research Question 3: What is the relationship, if any, between the adoption of HIT and organizational process?

$H3_0$: There is no statistically significant relationship between the adoption of HIT and organizational process.

$H3_a$: There is a statistically significant relationship between the adoption of HIT and organizational process.

Research Question 4: What is the relationship, if any, between the adoption of HIT and organizational productivity?

$H4_0$: There is no statistically significant relationship between the adoption of HIT and organizational productivity.

$H4_a$: There is a statistically significant relationship between the adoption of HIT and organizational productivity.

Research Question 5: What is the relationship, if any, between the adoption of HIT and patients' direct personal care?

$H5_0$: There is no statistically significant relationship between the adoption of HIT and patients' direct personal care.

$H5_a$: There is a statistically significant relationship between the adoption of HIT and patients' direct personal care.

Purpose of the Study

The purpose of this quantitative study was to explore the potential relationship among the variables HIT, organizational effectiveness, organizational exchange of information, organizational process, organizational productivity, and direct personal care, based on a survey of health care providers. Unlike previous studies that narrowly addressed only certain aspects of HIT, the study included conclusions on whether HIT significantly improves organization effectiveness. Hence, the study provided a strong foundation for reconciling the conflicting interests of health care providers, patients, and policy makers with regard to using HIT in health care delivery. Thus, the study may help to bridge large academic gaps identified in the problem statement as well as to influence the major stakeholders in health care sector (providers and patients) to develop a positive attitude toward HIT adoption. Health care providers and patients will find the results useful in making wise and cost-effective choices about adopting and using HIT.

Rationale for the Study

The study may help provide answers for both health care providers and patients regarding the relationship between HIT and organizational effectiveness. Toward this end, the study attempted to identify the major and current HIT applications and technologies that both providers and patients should use to enhance value creation in the

organization and health care fraternity. Ultimately, through the presentation of empirical evidence on the relationship between HIT and organizational effectiveness, the study might lead health care industry stakeholders to make more informed and appropriate decisions, which includes helping health care organizations achieve sustainable operations through the improved delivery of services to their clients.

Theoretical Base

The basis of the study was the theory that a positive link exists between the use of HIT in the health care sector and organizational effectiveness. The study involved examining the link using conventional theoretical frameworks in health care quality, particularly the sociotechnical systems theory (STS) and Donabedian's framework. Based on this theoretical relationship, judging organizational effectiveness involves not only reviewing how internal stakeholders may view HIT, but also how external people (clients) view it in terms of the quality, cost, and outcomes of service or product delivery. The study used STS and Donabedian's framework in designing research questions to rate positive aspects of HIT in achieving desired organizational goals. Such aspects formed a secondary link of theory between elements of organizational effectiveness and both internal and external parameters as further explained in Chapter 2. Hospital executives treat HIT as an umbrella term whose subtechnologies need investigating separately at certain points within the two theoretical frameworks.

Operational Definitions

Clinical decision support systems (CDSS): application systems that assist the clinician in applying new information to patient care through the analysis of patient-specific clinical variables (Payne, 2010).

Computerized Physician Order Entry (CPOE): refers to a variety of computer-based systems of ordering medications, which share the common features of automating the medication ordering process (Shojania, Duncan, McDonald, 2011)**.**

Electronic health record (EHR): electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards (Peek & Oftedahl, 2010) and that authorized clinicians and staff can create, manage, and consult across more than one health care organization (Congressional Budget Office, 2013).

GE centricity: medical software system used to acquire and store medical images as well as other information objects generated by the acquisition equipment (modalities) and other devices in the postprocessing workstations (National Association of County & City Health Officials, 2010).

Health information exchange: electronic movement of health-related information among health care organizations according to nationally recognized standards (Conway & Terrell, 2010).

Health information technology (HIT): general framework for explaining the complete management of health information in computerized systems as well as its secure exchange among health care providers, consumers, government, and insurers.

Health information technology refers to the tangible technical aspects of a health information system (National Association of County & City Health Officials, 2010).

iNotify: technology that provides opportunities for substantial improvement of health care processes through a unified communication framework between providers and patients (Halamka, 2013).

iPortal: technology that looks much like a website and offers a secure, compliant, two-way communication pathway between patients and their health care providers (Spear, 2012).

iTriage: technology that helps patients get answers to the most common medical questions in health care sectors (Peek & Oftedahl, 2010).

MediTech: group of medical technologies that help health care providers, patients, and caregivers accomplish various health care practices (National Association of County & City Health Officials, 2010).

Primary care practice: practice that serves as the patient's first point of entry into the health care system and as the continuing focal point for all needed health care services (U.S. Department of Health and Human Services, 2008).

Telemedicine: methods for the electronic transmission of medical information to sustain and enhance the health status of a patient (Hogg Foundation for Mental Health, 2008).

Assumptions

The basis of this quantitative study was an assumption of a socioeconomic and technical paradigm in which technological advances interact with socioeconomic outcomes. The study included a few assumptions as follows:

1. Patients' needs are increasing, while the number of health care providers hardly changes.
2. Sectors of the economy are slowly becoming more global; hence, there is a need for workers in the health care sector to change their attitude and use technology-based health care solutions.
3. The best way to achieve sustainable growth in the health care sector is through improved organizational effectiveness.
4. Not all health care providers make appropriate and adequate use of available HIT solutions due to lack of knowledge about their existence and proper use.
5. Certain challenges associated with HIT can adversely affect its adoption by health care providers.

Limitations, Scope, and Delimitation

Limitations

The study included a health care organization in one country, which limited the adoption of the findings in other countries that do not share similar attributes with that country. I used a convenience sample, which may not be very representative of the target population. Using a convenience sample may limit the generalizability of the result. I

considered only profit-making private health care institutions, which limited the adoption of the findings in governmental and nonprofit health care institutions.

Scope and Delimitations

In this study I investigated the potential relationship between information technology investment and healthcare delivery effectiveness. For the purpose of the study HIT was limited to health information and clinical decision support technologies such as: Meditech, GE-Centricity, iTriage, iNotify, telemedicine, and iPortal that were in use by the study population. The scope was limited to healthcare providers in the north Florida area. A unique composition of respondents helped to ensure a professionally dimensional balance. The sample drew from all levels and departments within the selected sample health care organization. The participants had at least one year of service in the health care organization, which helped ensure strong and reliable findings.

Significance and Social Change Implications of the Study

The social impact of this research included an improved, quality, timely, accessible, and effective health care delivery system. The health care delivery system will lead to patients' engagement in their wellness and health care through proactive use of various patient portals. Further, by using the findings, leaders of health care organizations, practitioners, and other stakeholders will properly target investments in HIT to maximize their use, benefits, and return on investment.

The study is important to health care providers. Organizational leaders who have not adopted advanced and current HIT solutions are likely to make a bold move to adopt them with strong optimism that they will pay off. Patients and the general community

may develop a positive attitude toward using HIT solutions and visit organizations with HIT solutions. The result may be a healthy society and population with improved understanding and use of technology in health care delivery.

Summary and Transition

The study background depicts how the health care sector is behind other industries adopting information technology and using it in a patient-centered manner due to uncertainty in the value of the technology. The delay in adopting HIT in the health care sector and using it in a patient-centered manner led to a well-informed problem statement for the study, which I attempted to reconcile through approaches that are different from previous studies. Given the nature of the study and the problem statement, the study included five research questions that guided the scope of the study. The study also included five assumptions and five hypotheses.

The purpose of the study was not only to achieve academic goals but also to impact social change through improved health care. The theoretical basis for the study linked HIT and organization effectiveness and direct personal care. To achieve more clarity with the terms used, this chapter included a separate section to explain relevant operational terms used in the study and the assumptions made before the study proceeded. Just like any study, the research had limitations and delimitations associated with its methodology. However, the result of the result may lead to significant social change having established and tested the relationship between HIT and organizational effectiveness from the formulated hypotheses. The next chapter contains a review of relevant literature that laid a foundation for the entire study.

Chapter 2: Literature Review

Introduction

The problem addressed in the study was the low quality of health care outcomes due to the ineffectiveness of organizational processes and resources. The purpose of the quantitative study was to investigate the potential relationship between HIT and organizational effectiveness, based on a survey of health care providers. The literature review provided a strong foundation for studies such as this one. A literature review involves description, summary, evaluation, and integration of previous reports of original research, as well as a foundation for designing and justifying new research (Ridley, 2012). The review revealed the gaps I filled with this study. Thus, the literature review became a platform to help formulate the study objectives and questions. Through the review, I was able to identify how past studies failed to include certain variables that could help readers fully understand the impact of HIT on health care delivery. Therefore, quite a number of areas received consideration for the review.

As the key concepts of this study, the review included HIT and organization effectiveness, as well as patient-centered care. The theoretical frameworks underpinning the study underwent review, which was in line with the sociotechnical theory and the Donabedian theory. Because the primary concern of the study was the link between health care delivery and HIT, the review revealed the link between various variables based on previous publications. In particular, the focus of the review was on the link between HIT and health care quality, health care outcome, personal care, and health care effectiveness. Because HIT is an umbrella term, the review substantiated various

technologies under this term, including mediTech, telemedicine, GE Centricity, iTriage, iPortal, and iNotify. Arriving at the best method involved reviewing different research methods from which I chose the final method. Finally, I summarized the literature review and identified gaps to justify the type of method and approach adopted for the study.

Literature Review Strategy

The strategy for the literature review involved relying on a comprehensive approach to get diverse and quality information from the literature that could help to prove or disapprove stated hypotheses, achieve study objectives, and answer research questions. The systemic literature review process employed by Brereton, Kitchenham, Budgen, Turner, and Khalil, (2007) helped to locate, evaluate, and summarize studies related to the impact of IT on organizational effectiveness. The major categories of literature considered for the study were published books, peer-reviewed journal articles, magazines, corporate studies and reports, academic studies, government and state publications, and other primary data including from the World Wide Web. The online database Business Source Premier served as a means of collecting journal articles less than 5 years old. The process involved reviewing the literature retrieved from different sources and using a screening review form that contained a sequence of categorization questions created to track the right literature sources, content, and quality. Key search terms and combinations included health information technology and effectiveness, technology and productivity, technology and care delivery, health IT and dehumanization, HIT and depersonalization of health care, and technology and personal care.

The study design did not restrain the initial search criterion. I employed a critical analysis of scientific literature, including evidence from sources with several different study designs (Webster & Watson, 2002). I also divided the retrieved literature from different sources and with different designs into four categories: hypothesis-testing studies, reviews, predictive reports, and descriptive reports.

I categorized the sources as either nonsystematic or systematic by checking the methods used in the literature sources to verify whether the researchers employed an acceptable method to arrive at the claimed evidence. The hypothesis-testing studies were among the studies whose authors compared data between cohorts or across fixed time spans to answer a study question using statistical tests. The review also included hypothesis-testing studies that involved intervention with a concurrent comparison group and intervention without a concurrent group for comparison. These included time-series studies, pre–post studies, and historical control group studies (Moore, McCabe, & Craig, 2007). A third strategy applied to accomplish the literature review involved considering studies with predictive analyses.

These studies included modeling techniques to forecast what might take place with a HIT implementation instead of what actually happened. This strategy was consistent with the HIT elements of cost-benefit and cost-effectiveness analyses (Zikmund, Babin, Carr, & Griffin, 2008). The strategy also involved accessing data from many studies with a variety of assumptions. The literature considered was produced by both private and public institutions. The year of publication was a significant factor in

this review, as the intent was to use only literature published between 2008 and 2015 to obtain current information.

Health Information Technology

Health information technology provides a general framework to explain the complete management of health information in computerized systems as well as its secure exchange among health care providers, consumers, government, and insurers (Peek & Oftedahl, 2010). Health information technology may be the most promising tool for enhancing the overall efficiency, quality, and safety of the health care delivery system. Benefits of broad and consistent use of HIT will include improved health care effectiveness or quality, increased health care efficiency or productivity, fewer medical errors, and reduced health care procedural errors and inaccuracy (Kumar, 2011). Other improvements will include reduced health care costs, enhanced efficiency in health care work processes and administrative efficiencies, reduced paperwork and unproductive work time (White & Danis, 2013), extended real-time communications among health care professionals, and increased access to affordable health care (Lagu, Lezzoni & Lindenaur, 2014). Health information technology benefits and potentials are far-reaching; interoperable HIT enhances individual patient care and involves other public benefits including early detection of contagious infection outbreaks (Kumar, 2011), enhanced tracking of chronic disease management, and assessment of health care (White & Danis, 2013). Further, HIT permits health care providers to gather, keep, retrieve, and transfer information electronically (Varkey, Horne, & Bennet, 2010). However, HIT is not without challenges, as it lacks precise definition, which challenges its use owing to the

large volume of technological applications and the rapid pace of technological changes (Baker, Gustafson, & Shah, 2014). Terms that fall under HIT define diverse products; hence, the exact functions of a HIT system will rely on the limits of its implementation in a given health care setting. A primary concern for HIT is patient security. The most significant aspect of HIT is the steps taken to safeguard patients' confidentiality (Lansisalmi, Kivimaki, Aalto, & Ruoranen, 2010). The private details of patients regarding their medical history, account number, social security number, and credit card numbers, among others, should remain confidential in a good working system of HIT (Lehoux, 2010). Hospitals therefore depend on both health care providers and technology professionals to ensure that the systems used to link patients and health care providers are safe from unconcerned parties.

Organizational Effectiveness

Organizational effectiveness is vital to economic success, including the success of profit-based health care institutions nonprofit organizations, alike. To realize increased and sustainable business outcomes, organizational leaders should implement a strategy in which employees engage with the organization. Employees should also have the right skills to use available organizational resources and systems (Vilamovska, 2010). The leaders of many organizations struggle to achieve effectiveness through adopting new processes and systems of work which they perceive to have links with organizational productivity. To understand what constitutes an effective organization as well as the link between organizational effectiveness and productivity, researchers have emphasized the relationship between organizational structure, strategy, organizational roles, people

systems, leadership, organizational culture and values, and employee engagement (Vilamovska, 2010). Therefore, organizational effectiveness is a situation whereby all these elements exist in harmony and support one another for the overall benefit of the organization.

The performance level of various organization systems and functions contributes to its effectiveness. Health information technology in the context of organizational effectiveness implies a situation in which the system supports organizational structure, strategy, roles, people systems, leadership, organizational culture, values, and employees to perform and interact in the required manner, electronically (Kumar, 2011). A more effective execution of business strategy would lead to improved financial performance. Organizations whose leaders do not fully engage the workforce in organization business strategy are bound to have difficulty in achieving effectiveness owing to an inability to realize reliable and sustainable business outcomes (Los Angeles Care Health Plan, 2010). The goal of health care organizational leaders is to make a profit. Towards this end, effectiveness in providing services to their clients is instrumental to success. The connection between successful HIT strategy implementation and workforce engagement factors is therefore vital.

When the workforce engages, organizational elements usually work together to achieve a sound strategy. The result of this strategy is strong performance, great customer experience, and profitability (Galy & Sauceda, 2014; Rosenback & Young, 2008). Therefore, the level at which the organization is able to achieve more profits, enhance performance, improve customer experience and produce customer loyalty determines

organizational effectiveness. In the health care sector, the tendency of repeated visits or engagement with the same physician or the recurrent use or preference for the same health care system or organization can gauge such loyalty (Suki, 2011). Thus, a relationship exists among customer loyalty, organizational performance, and profits.

Organizations with high performance and profits tend to grow and develop. In the health care sector, investments into more advanced and techno-savvy equipment and systems signify this, which in turn improves the quality of health care services. Notably, patient treatments alone do not offer a comprehensive answer to health care needs and effectiveness. Instead, diagnostic processes and activities, together with patient follow-up, should equally receive appropriate emphasis (Vilamovska, 2010). Hence, health care organizations need holistic improvements in their performance.

Theoretical Frameworks Underpinning This Study

The study included STS and Donabedian's framework for health care quality evaluation. Sociotechnical systems theory relates to a scenario in which people employ information and communication technology (ICT) as a communication medium (Shortell, 2012). Sociotechnical systems theory helps to understand how the use of ICT brings about autonomous work groups, job enrichment, and workplace democracy to enhance organizational performance. The basis of the conceptual framework of the study was also on Donabedian's classic organizational structure, process, and outcome model of quality assessment (Donabedian, 2005). The structure, process, and outcome model is a tool for assessing health care quality.

Sociotechnical Theory

The basis of STS is the use of ICT. Adoption of STS development leads to systems that are more acceptable and deliver better value to organization (Baxter & Sommerville, 2011).The Tavistock Institute of Human Relations in the 1950s employed STS in work systems in organizations. The theory's concepts are organizational. Thus a socio-technical approach, which is not organizational, is not fit for consideration. STS offers an explanatory framework for organizational life (Baxter & Sommerville, 2011). Basing this study on STS therefore involved an exploration of both ICT use in the health care sector and the history of such health care organizations.

Sociotechnical systems theory offers a foundation on which to design an organization. It includes a theoretical framework for understanding the complex way in which the workforce cooperates and interacts with tools and technology to do work (Vespignani, 2012). Using STS in this study facilitated understanding of how realities in health care operations help or such organizations achieve goals. The theory treats the organizational collection of human and technical resources as a system that yields work. It emphasizes the link between the people in their respective work roles and technical artifacts used to get the work done (Vespignani, 2012). Using the sociotechnical systems theory in this study helped to reveal how the health care system actually functions, how using HIT helps people solve health problems, and if HIT affects how the work of one person impacts another.

Donabedian Theory

In his first three elements of the theory on methodologies used in health services research, Donabedian (2003) identified three dimensions to help examine quality of health care. These include structure, process, and outcome (Donabedian, 2003). The three elements later formed the core blocks of his model for assessing the quality of medical care, thereby leading to its widespread acceptance. The three elements are not quality attributes but instead are the classifications for the kinds of information that both health care organizations and the population can use to judge health care quality. Health care quality can be poor, fair, or good (Donabedian, 2003). The theory suggests that making conclusions about health care quality needs an established relationship between structure, process, and outcome and that the link between the three elements should be a probability instead of a certainty (Donabedian, 2003). Therefore, this study involved considering how HIT relates to the health care structure, process, and outcomes as measures of quality within Donabedian's theory.

The study involved evaluating the use of HIT based on how it influences the organizational health care structures, processes, and outcomes. The structural influence of HIT encompasses hospital buildings, health care equipment, financing, and staffing issues (Donabedian, 2005). In Donabedian's model, researchers can deduce information regarding the quality of care from organizational structure, process, and outcomes (Donabedian, 2005). Organizational process in the study related to the transactions that take place between health care providers and patients throughout the health care delivery

process. Organizational outcomes in the study referred to the impact of health care on the patients' and populations' health status.

In the theoretical model of Donabedian's (2005) quality assessment, a chain of the three elements linked by unidirectional arrows represents quality measures and indicators. Here, structure is the first element linked to process, which again links to outcomes (Donabedian, 2005). The framework depicts that HIT would first influence organization structure, which in turn influences health care processes, hence leading to the desirable or undesirable health care outcomes.

In employing a structural assessment of health care quality, it is important to consider all factors that affect the background in which health care organizations provide care. These context factors in structure entail human resources, physical facility and equipment, and organizational characteristics such as payment methods and employee training (Dahlgaard, Pettersen, & Dahlgaard-Park, 2011). Employing a structural assessment of health care quality implies that HIT in one way or another can affect how and when health care organizations conduct their human resources programs, such as recruitment capacity and training needs, establishment of physical facility and equipment, and payment methods. Through these structural elements, this study will involve an attempt to reveal how health care providers and patients operate within a health care facility or system. Based on the unidirectional link among the three elements of quality assessment, any problem that emerges in the health care process correlates to the structural element.

Health care process can imply actions committed by patients or their family members. Processes can be technical or interpersonal relative to the delivery of care. Process sums all the actions that comprise health care, including diagnosis, preventive care, patient education, and treatment (Donabedian, 2005). In view of Donabedian's (2005) theory, measuring health care process is almost equivalent to quality measurement given that process involves all acts of health care delivery (Rosenback & Young, 2008). To access information about process, one can make use of medical records, interviews with health care providers and patients, and direct observations on health care visits (Donabedian, 2003).

Process relates to outcome

At times, outcomes are the most significant indicators of health care quality, since improvement of health status is the fundamental goal of any health care. Health care outcomes entail all effects of health care on patients, including changes in patients' behavior or knowledge, health status, and subsequent satisfaction (Onway & Terrell, 2010). Deducing the relationship between health care process and outcomes requires a large sample size adjusted by case mix as well as long-term follow-ups owing to the length of time that some health care outcomes take to become evident.

Donabedian's theory explains that the three elements necessitate researchers to deduce the link between them to develop a chain of causation that can conceptually help us understand health care systems. Evaluating Donabedian's process of outcomes involves five steps: planning, goal setting, implementation, analysis, and feedback (Rosenback & Young, 2008). Follow-up on a patient examination by a health care

provider would therefore require the provider to formulate a problem list, mutual goals, and a care plan. The patient must also respond appropriately. Favorable and appropriate responses from the patient signify the fulfillment of health care goals. Providers need to communicate and document the favorable response. Patients' failure to respond favorably calls for the provider to make adjustments, change programs, and begin the process again. Using Donabedian's theory, I attempted to reveal how HIT impacts these outcome processes, which amounts to health care quality.

The Variables and the Linkages Explained

Health Information Technology and Quality

Safety and efficiency in health care provision are factors that contribute to health care quality as developed by various health care organizations. Health information technology is IT based, which has the potential to enhance the quality, safety, and efficiency of health care services (Varkey, Horne, & Bennet., 2010). Treatment adherence, weight loss, smoking cessation, diet and physical activity, postoperative hematoma, disease management and hemorrhage are examples of conditions that frequently occur which HIT can positively help to control, thereby leading to improved quality outcome (Riley et al., 2011). Clinical experts posit that the conditions partly capture HIT's potential value, but the link between HIT and quality is best understood by evaluating the level of safety and efficiency that patients have after and before treatments and follow-up processes.

Health information technology offers health care providers and patients new ways to access and use health information. Thus, HIT is capable of improving the quality of

health care through improved safety and efficiency in the system (Lehoux, 2010). Delivery of quality health care through HIT requires the providers as well as patients to integrate complex information from diverse sources (National Association of County & City Health Officials, 2010). Thus, the quality of health care accrued from HIT links to the efficient access and appropriate use of health care information. Likewise, quality health care outcomes attributed to HIT result from patients' ability to access information, which helps them to manage their health condition as well as communicate with the health care system more effectively (Omachonu, 2010). Beyond delivery and outcome, an association exists between HIT and cost reduction.

The low cost associated with using HIT to provide health care signifies that it improves the economic quality of health care provision. Policy makers have debated the ability of HIT to help health care organizations, providers, and patients save on health care costs through quality improvements and efficiencies (Omachonu, 2010). Based on the savings accrued from HIT implementation, leaders of health care institutions would be able to invest in more advanced technologies to further improve the quality of health care provision as well as patient outcome.

Health Information Technology and Outcome

Health care outcome entails various elements including not only patient-centered outcomes but also organizational ones concerning structures and processes. Using HIT to deliver health care ensures appropriate information is available to various stakeholders within the health care system at all stages of the health care process (Cutler & Everett, 2010). Improved outcomes between health care providers and the patients, as well as

between patients and caregivers, are achievable. Every stakeholder in the health care system, including patients, patients' family members, and health care providers, needs access to key information to make transitions of health care safe and effective.

Health information technology improves outcomes in a variety of ways. Using HIT helps to improve communication during transitions between health care providers, caregivers, community support groups, and patients (Lansisalmi et al., 2010). This adds up to improved health care outcomes. Using HIT facilitates the development of standardized processes for reconciling medication needs and coordinating patients' care. The improvement in health care outcomes results from HIT's potential in helping to account for receiving, sending, or acting upon certain health care information for safe and effective transitions of care (Baker, Gustafson & Shah, 2014; Blumenthal & Tavenner, 2010). Improved health care outcomes also link to: (a) increased use of case management as well as professional care coordination, (b) expanded role of pharmacists in medication reconciliation in transitions of care, (c) development of performance indicators to encourage strong transitions of care, and (d) implementation of payment systems that bring into line incentives in the entire health care system (Kumar, 2011). Further, HIT tends to enhance health care emergency response and outcome.

Health information technology is essential for emergency response (Halamka, 2013). The technology provides the community, health providers, patients, and family caregivers standardized and integrated approaches and steps to respond to health emergencies (Vilamovska, 2010). Beginning from the conventional use of telephones, organizations have integrated communication technology to achieve improved health care

outcomes with internet-based applications through mobile handsets and systems (Halamka, 2013). Health care outcomes can link to job design. Health information technology plays a key role in advising how to align members of the workforce with their health care roles, systems, and resources (Mitchell et al., 2012; Vespignani, 2012). Unlike many applications in which IT and job design are cumbersome to compare, proponents of emergency response systems recognize the implementation of decentralized IT systems to facilitate job design, which when properly done leads to enhanced health care outcomes.

Health Information Technology and Cost

Cost is a critical and sometimes limiting factor in HIT deployment. Health information technology tends to reduce the cost of health care (Agarwal, Gao, DesRoches, & Jha, 2010; Menachemi & Collum, 2011). However, this should not always be the case because the development, implementation, and adoption of HIT is an expensive undertaking that should be considered with care. Investment in HIT significantly affects business performance (Bhattercherjee et al., 2010). Whether in developed or developing nations, HIT is an expensive investment that affects the operations of health care institutions. However, the higher levels of IT investment help organizational leaders reduce operating expenses, especially in acute care hospitals, though this can be realized only after the hospital has reached the threshold investment level. At lower levels of HIT investment, leaders of health care providers' institutions encounter rising operating expenses, and not all health care institutions reap the same benefit from their HIT investments (Lapointe, Mignerat, & Vedel, 2011). In return for HIT investment and applications, leaders of non-profit health care institutions and

hospitals seem to realize a smaller cost-reduction impact compared to profit-making hospitals, thus reaching the tipping point at higher levels of HIT capital (Vilamovska, 2010). There are cost benefits related to HIT investments.

Hospitals whose leaders invest in HIT derive more cost benefits over time. This impact can cause investments in nonprofit hospitals to shift from cost increases to cost reduction. In the short term, preferably over a 1-year period, the contribution of HIT to productivity is generally equal to the capital cost invested in it (Vilamovska, 2010). However, between 5 and 7 years, the contribution of HIT to health care output and productivity is five times its capital input costs. This depicts the significance of analyzing time-lag impacts of HIT investments in health care provision. Health information technology investments generally initiate large organizational changes and consume large amounts of the organization's time and human capital. This can make the entire process costly, though it has a positive impact on health care provision.

Health Information Technology and Direct Personal Care

Patient centeredness, care depersonalization, personal care, dehumanized care, and impersonal care are some of the terms researchers have used to describe the types of patient–practitioner relations in health care settings. The personal care or patient-centered approach focuses on collaboration, empathy, caring, shared meaning, mutual dependence, and family and patient involvement. The focus of the paternalistic or traditional approach is on the practitioner or physician as the expert who motivates and directs patients toward compliance.

Effective use of HIT tools and health communication processes has the potential to change the way health care practitioners receive, process, and evaluate health information. According to Healthy People 2020 (2012), continual feedback, productive interactions, and access to evidence on the effectiveness of treatments and interventions will likely transform the traditional patient–provider relationship. Integration of the various elements of health care service is critical to such information sharing, as it enables a greater degree of process automation of routine tasks, comprehensive data analysis, and reporting capabilities, thus improving physician and management decisions, medications, laboratory tests, and other services.

The proliferation in the variety of clinical and medical information technologies has resulted in a new generation of providers giving specialized but very impersonal care. There is growing concern about technology interfering with patient–doctor relationships. Practitioner reports have also drawn attention to the fact that critical issues affecting physicians' use of information systems are not necessarily technical but social (Martin & Omari, 2015). The new breed of clinical information systems interferes with health care practitioners' traditional practice routines and requires physicians to change the traditional ways they have recorded, retrieved, and used clinical data. Also, clinical information systems may require practitioners to change the ways they have examined and interacted with their patients. The loss of these individual characteristics may make physicians resistant to using electronic systems because they see the new technology as a threat to their professional autonomy and control.

According to Bailey (2011), the main concern about HIT is not the technology itself, but the design principles and implementation. Bailey (2011) posited that how people choose to use a new technology has everything to do with whether the technology adds to their humanity or detracts from it. Therefore, patients may likely see their visits as depersonalized because of the limited time that the practitioners may have for their personal care, after spending most of the time reading and documenting patient information on a computer. From the patient's perspective, whether the patient feels satisfied with the level of interaction and care given by the physician or nurse determines the benefit of HIT.

The only consistent part of patient care is the direct connection between the care provider and the patient. Tulu, Burkhard, and Horan (2011) discussed the importance of factors such as physician time and the physician–patient interaction; both ingredients are necessary for improved quality. One of the benefits expected from the implementation of electronic health record systems is a positive influence on accessibility and communication of information to improve the quality of personal direct care. Much of the HIT literature begins with a discussion regarding the consensus among policy makers, health care researchers, and quality experts that widespread adoption of HIT will lead to increased efficiency and improved patient care (Blumenthal, 2010; Institute of Medicine, 2011; Office of the National Coordinator for Health Information, 2013). The enthusiasm regarding the potential benefits of HIT on improving the delivery of health care has led to a national policy urging providers to adopt HIT. The relationship of HIT on direct personal care is part of the questions under study.

Application of Health Information Technology in Care Delivery

MediTech

Health information technology as an umbrella term comprises many technologies. MediTech refers to a group of medical technologies that helps health care providers, patients, and caregivers accomplish various health care practices (CFR Parts 412, 413, 422, et al., 2010). Several health care providers have invested in MediTech systems to help them accomplish various purposes regarding information management, electronic medical records, long-term care, home care, behavioral health, and a wide range of solutions for physician practices. The MediTech systems are the best in their class, although they have at times posed challenges to health care business as well as clinical intelligence when incorporating with a non-MediTech third-party system. Further, this technology has challenges associated with inherent complexities, the time-intensive nature of reporting, and the lack of speed and usability, which prevent health care executives, medical analysts, and clinicians from enhancing their decision-making process and discovering diagnostic and treatment outcomes.

Telemedicine

Telemedicine is a term in HIT that describes methods for the electronic transmission of medical information to sustain and enhance the health status of a patient. The methods that support this concept can include technologies for storing and forwarding medical documents and images (Halamka, 2013), secure messaging, data exchange, remote monitoring of patient's health status, medical reminders, and alerts (Kumar, 2011). The technology also offers physicians the ability to observe and diagnose

a patient's condition through videoconference and make appropriate recommendations for treatment (Agarwal & Lau, 2010). A number of products and services, as well as their respective industries, support the development of diverse applications that support telemedicine. These include medical device manufacturers, IT vendors, hospitals, venture capitalists, nursing homes, and pharmacies (Lehoux, 2010). A reliance on remote communication via electronic devices is common to all these industries involved in developing various telemedicine applications.

The concept of telemedicine best suits medical environments with shortages of health care professionals, increased cases of chronic health conditions, and growing health care costs for patients. Telemedicine offers a better way to enhance efficiency in the delivery of health care. Other factors that compound the need for telemedicine include rising population growth rates; a shortage of trained and licensed medical professionals; a need for proper health care for older adults; an increased presence of physically challenged patients (Omachonu, 2010); a shortage of health care facilities, especially in rural areas; and an overall need to improve community health (Varkey et al., 2010, Song & Vong, 2014). Telemedicine can assist in solving these health challenges.

Telemedicine ensures the maximum use of available health care specialists because the technology permits them to not only remotely diagnose and monitor but also recommend appropriate treatment for patients in remote and rural areas. The technology reduces exposure of patients to infections by limiting, if not eliminating, visits to a health care facility, institution, or physician's office. The technology can alleviate the gaps in health care provision associated with underserved patients owing to a shortage of

subspecialty providers. The use of telemedicine, telecommunications technologies, and connectivity has shown real-world positive impacts on patients, which has amounted to observable outcomes (Washington State Department of Health, 2010). These include reduced use of emergency rooms, improved health care outcomes, cost savings, improved access to health care providers, and increased patient satisfaction.

Now the focus has shifted to innovation and the implementation of advanced technology platforms to improve the delivery of health care services through telemedicine technology. Two major platforms that have found an application in telemedicine are wireless technologies and telemonitoring technologies, both of which promise a significant development in the delivery of quality telemedical care (Halamka, 2013). The success of telemedicine in delivering health care services entails the development and installation of super-speed wireless telecommunications networks integrated with large-scale search engines as well as mobile devices, which permit real-time diagnosis and communication with patients without their necessarily visiting a health care facility. The approach enables health care professionals to address the problems of the patient before engaging in major interventions, hence creating a patient-centered approach that can change people's expectations of health care systems.

Developments in wireless and mobile applications have been the driving force that allow patients to access their doctors, irrespective of geographical distances or physical barriers between them (Washington State Department of Health, 2010). Technological development coupled with health challenges indicate that patients want to consult with their physicians at times when they cannot physically reach the available

health care facilities, even at odd hours. With computer information services, in telemedicine, it has been possible for physicians to gather health information and store and forward it as text, video interactions, and still images (Washington State Department of Health, 2010). In developed nations, it is a common practice for patients to meet with their physician through real-time teleconferencing. This is still a feat in developing nations. Through such data exchanges, as well as real-time discussions with the patient, physicians can treat and manage several specific and routine medical problems. In developing telemedicine further, patient-side diagnostic instruments such as cameras, stethoscopes, blood tests, and skilled medical technicians can expand the range of medical services provided.

Smart phones offer a more powerful personal computing and mobile device connected to a global, high-speed network. Although this mobile series is still widespread in developed countries (Washington State Department of Health, 2010), its widespread adoption in other nations would fully revolutionize delivery of health care across the world. With Wi-Fi or Bluetooth technologies, health care providers can configure the smart phone to special health care sensors (Halamka, 2013). The underlying hardware of emerging mobile phone devices enables them to network with both local and distant devices, which opens a range of health care potentials. Apart from increased access to medical care, an association exists between telemedicine and a reduced cost for health care services. Developments in sensor networks technology also make remote monitoring of patients' conditions feasible, hence contributing to a high level of quality health care.

GE Centricity

GE Centricity allows multiple users to access remotely stored medical images from compatible computers on a network. Radiologists can use the images for manipulating, interpreting diagnostic results, and postdiagnostic review of the images and other stored objects (Deloitte, 2010). GE Centricity is a medical software system used to acquire and store medical images as well as other information and objects generated by the acquisition equipment (modalities) and other devices in the postprocessing workstations (Halamka, 2013). The software in both the client and server of GE Centricity works only with off-the-shelf hardware technology with defined minimum specifications (Spear, 2012).

GE Centricity operates within an environment that meets defined minimum specifications. The technology permits different users with various methods of exporting information to send images and other objects to external systems over the network. GE Centricity uses a protocol to save images on CD and other proprietary formats and to print key medical images (Washington State Department of Health, 2010). The technology achieves storing and sharing of digital patient records by accepting patients' order and report information from health care information systems through the HL7 protocol and by sending notifications to system users (patients and physicians) about the creation of notes within the GE system, change of study status, and arrival of new studies.

GE Centricity provides integration capabilities with other types of information systems in the health care, dictation, and voice recognition systems. The system supports desktop integration with different information systems via a browser-based application

system to invoke and display any study identified by the external system via different mechanisms and different degree of control of the viewer (Deloitte, 2010). GE Centricity also supports desktop integration with different information systems to invoke modules of such systems for display of supplementary information associated with the study selected within GE Centricity (Deloitte, 2010). The technology supports desktop integration with various advanced visualization and processing software packages to invoke them for additional processing of imaging information stored within GE Centricity (Halamka, 2013). The information within the GE Centricity system may pertain to a specific study, order, visit, or patient. In addition, radiologists, physicians and nurses use the desktop integration to perform certain operations, including the dictation of diagnostic reports within external systems using information provided by GE Centricity.

iTriage

The iTriage technology helps to link patients and health care providers with respect to the patients' health conditions. The iTriage technological initiative is a global health care technology company launched to help patients get answers to most common medical questions in the health care sector (Halamka, 2013). For instance, the technology helps patients know what could be wrong with their health and where to go for treatment. People can download the free iTriage application to their iPhone and Android devices, and millions of people around the world (Spear, 2012) have already done so. Thousands of health care providers use the technology to help them realize and achieve financial goals as well as to set care coordination and meet patient satisfaction goals.

Through iTriage Appointment Setting, patients can conveniently schedule appointments with their health care providers. iTriage Appointment Setting increases patient traffic, enhances patients' experience, and attracts patients seeking specific medical services (iTriage, 2010). Allowing patients to set appointments also increases operational efficiencies, satisfaction, retention, and competitive advantage. In addition to being a free mobile application, iTriage is a website patients can log into, check symptoms, and learn about possible causes and treatments. Both patients and health care providers can search the symptom directory by selecting a body part, or browse from an alphabetical list. Users of this technology can research specific diseases and conditions to learn about the treatment options and procedures, as well as costs and common complications.

Physicians at Harvard Medical School created and reviewed the medical information in iTriage. The purpose is to update information on research for particular medications, including use instructions, possible side effects, and overdoses. The iTriage website offers a wide array of options for treatment destinations, including a trip to the health care facility, urgent care center, or retail clinic with consideration of a cost effective option (iTriage, 2010). Patients can learn which specialists are appropriate to address their health condition. Patients are able, through this technology, to locate and compare nearby health care options, including nearby hospital emergency rooms, urgent care centers, physicians, pharmacies, retail clinics, and outpatient clinics (Washington State Department of Health, 2010). Patients can carry out the following activities while making their choices: sort physicians by distance or ratings, check the hospital

emergency room wait times, and view the health care facilities and offices on maps. Patients can log into the website, which includes directions on how to choose a medical provider, check into emergency rooms and urgent care centers, set appointments, and make phone calls (iTriage, 2010).

The iTriage technology also features My iTriage, which offers a place to store and retrieve personal health information. My iTriage, as an application within the main technology, helps patients to manage their health as well as the health of their loved ones easily (Case Study, 2012). Patients are able to store information on insurance and health condition information, in addition to procedures and preferred doctors and facilities information (Case Study, 2012). Further benefits associated with this technology include saving medication and dosage information, saving money on medications with the iTriage pharmacy discount program, accessing personal health records, and efficiently managing appointments (Case Study, 2012). Beyond iTriage, there are other Web-based gateways into medical practice and care such as iPortal.

iPortal

iPortal offers a secure and compliant two-way communication pathway between patients and their respective health care providers (Emont, 2011). Unlike office operations, iPortal provides a convenient, 24-hour, self-service option for patients (Washington State Department of Health, 2010). The technology permits patients to handle business as well as clinical interactions with their practice at their own convenience and permits the health care staff to respond when it suits them. The features of iPortals vary, though the available options in the technology can typically allow

patients to complete, manage, and interact with their health care provider. iPortal allows registration, appointment scheduling and confirmations, financial clearance, specialty referrals, medical history, and preventive care (Emont, 2011). Other features include test result notification and tracking, patient and health care provider communication, prescription renewal, and online bill payment (Washington State Department of Health, 2010). The best patient iPortals permit hospitals staff and administrators to engage communities as well as health care providers in care plan management and health maintenance.

Through the use of iPortal, leaders of health care organizations can better integrate patients and their providers (Harris, 2012), realize meaningful use, develop a strong basis for more integrated and accountable health care (Wellness Portal, 2010), and have enhanced efficiency when patients participate in at least some of the time-consuming tasks before coming to the hospital (Emont, 2011). The portal helps move patients into ambulatory care, which helps them to avoid steep inpatient and readmission costs. The technology simplifies patient care through provider–patient efficiency and sustains the patient-centric focus needed in medical homes. iPortal delivers functions such as clinical messaging, electronic prescription requests and refills, patient demographic updating, test result alerts, secure posting of medical information, and automatic appointment scheduling (Emont, 2011).

The portal has the potential to align processes across the continuum of care, care plans, and admissions; motivate patients to manage medications; reduce costly readmissions; enhance population health management; and facilitate ambulatory care

expansion. It also enhances the recognition of a health system brand through patient outreach (Harris, 2012). The design of iPortals includes patients first and is built around the lives, priorities, and workflow needs of both patients and providers (Harris, 2012). The health care providers who use patients' iPortals gain more power to streamline health care scheduling (Wellness Portal, 2010), accelerate the preadmission process, update patient care plans, and reduce the costs of admissions and readmissions (Emont, 2011). Irrespective of specific functionalities, patients find value in a well-designed and functional patient portal because they feel involved in their care process and have a greater menu of choices from which to choose (Harris, 2012). Additional benefits associated with the use of iPortal include strengthening physician–patient relationships, sharing information securely, connecting referring physicians, saving costs on practice operations, improving accuracy, enhancing access, and improving transparency (Washington State Department of Health, 2010). The portal can also streamline patients' access to their doctors by offering self-serve access to the functions and information they most value from health care providers.

iNotify

iNotify provides opportunities for substantial improvement of health care processes through a unified communication framework between providers and patients. Quality patient care can result from better monitoring of patient conditions (Spear, 2012), which can occur most effectively through precise and prompt communication among health care providers (Halamka, 2013), enhanced coordination among providers in delivering on daily tasks, and improved access to information for decision making. These

processes require the application of iNotify. Wireless technology helps to achieve the functionalities of iNotify, especially in the latest generation of iPhones. Technological advances in communication security, patient privacy, and push data delivery through automatic prompt notification in the event of medical crises or urgent situations have strengthened the process of health care provision (Halamka, 2013). Patients with iNotify receive notifications and reminders on what to do to fulfill an entire treatment process (Washington State Department of Health, 2010). Providers can also receive notification messages about patients' in-wait and the actions to take. The use of iNotify ensures patients have efficient, appropriate, and timely health care attendance and practices (Washington State Department of Health, 2010). With the variables and linkages explained, the next section contains a discussion on gaps in the literature and on how the current study may fill some of the gaps.

Gaps in the Literature

The literature review revealed that many of the studies reviewed had a limited scope. The focus of the studies was either on organization data or on one or two technologies in HIT. A focus on organization health data does not result in a comprehensive picture on the influence of HIT across the United States or around the world, because such a study includes only one type of sample. A focus on one or two HITs can also prevent researchers from making comprehensive conclusions about the impact on health care outcomes. Using respondents from only profit-making health care organizations in the reviewed literature also contributed to the literature gaps because this results in findings being unsuitable for non-profit-making health care organizations. Most

of the studies presented only the positive side of the impact that HIT has on health care delivery, without considering how the use of HIT can impact health care delivery negatively.

In a majority of the literature, the researchers employed a qualitative approach. Even though a qualitative approach could fit the nature of a research topic regarding the impact of HIT on health care delivery, the approach would limit the level of validity of the findings, because a qualitative study can support only a few respondents. Lastly, most of the studies included secondary data as provided by HIT vendors, health care databases, or patients' responses, but failed to report the same from the primary views of health care providers. This made the findings inappropriate in countries or organizations where providers have no experiences similar to those reported in the studies and in other HIT publications. There was a clear lack of literature on the relationship between HIT and health care delivery from the providers' point of view.

No study or collection of studies existed that would allow readers to make determined decisions and gain generalized knowledge of the reported benefits of HIT. Apart from studies from HIT leaders, no other researchers have assessed HIT systems with comprehensive functionality while also including data on costs, relevant organizational context, and organizational process change, as well as data on implementation. The limitation in generalizable knowledge is not a simple matter of study design and internal validity. Notably, the generalizability of study evidence will remain low if respondents make no more comprehensive, relevant, and systematic descriptions and measurements regarding the use of HIT, the individuals who use HIT,

and the environment in which they use HIT. I considered all these and developed a comprehensive approach that filled most of the identified gaps.

Literature Review Summary

In summary, the chapter began with a discussion on health information technology (HIT) and organizational effectiveness, and personal care. A review of literature was conducted that contained the findings of similar research that indicated where gaps exist. A discussion of the theoretical frameworks followed, to build a foundation on the framework used to explain organizational life and models used to assess health care quality. The review also included an explanation of the variables and linkages which included HIT and quality, HIT and outcome, HIT and cost, and HIT and direct personal care. I also discussed the application of HIT/HIS including MediTech, telemedicine, GE Centricity, iTriage, iPortal, and iNotify in care delivery. The chapter was concluded by identifying gaps in the literature that revealed a need for further study. I provided diverse and quality information that helped to prove or disprove the study hypotheses, achieved the objectives, answered the research questions through critical analysis of scientific literature, and categorized the literature as nonsystematic or systematic and descriptive or predictive.

Health information technology has a general framework to explain the complete management of health information in computerized systems as well as its secure exchange among health care providers, consumers, government, and insurers. Many researchers have associated HIT with (a) improved health care effectiveness or quality, (b) increased health care efficiency or productivity, (c) prevention of medical errors and

reduction in health care procedural correctness and accuracy, (d) reduced health care costs, (e) enhanced efficiency in the health care work processes and administrative efficiencies, (f) reduced paperwork and unproductive work time, (g) extended real-time communications among health care professionals, and (h) increased access to affordable health care. Health information technology permits health care providers to gather, keep, retrieve, and transfer information electronically.

The review revealed that organizational effectiveness is vital to any economic success, including organizations in the health care sector. Health information technology in the context of organization effectiveness implies a situation where organizational structure, strategy, roles, people systems, leadership, organizational culture, values, and employees receive electronic support to perform and interact in the required manner. Many organizational leaders struggle to achieve this effectiveness through adopting new processes and systems of work, which they perceive to have links with organizational productivity. HIT adoption has required organizational elements to work together to achieve a sound strategy, especially with an engaged workforce, thereby yielding high performance, great customer experience, and profitability.

The theoretical frameworks that underpinned the study were STS and Donabedian's (2005) theory. The sociotechnical theory, although historically seen as relating to manufacturing, remains relevant. The model helped to understand how using information communication technology ICT brings about autonomous work groups, worker democracy, and job enrichment. Donabedian's theory of quality assessment addressed organizational structure, process, and outcome. The three elements of the

theory serve as the classifications for the kinds of information used to judge health care quality. A chain of the three elements linked by unidirectional arrows represents Donabedian's quality assessment, quality measures, and indicators. Structural assessment of health care quality, all factors that impact the background in which health care providers give care, needs consideration. Process sums all the actions that comprise health care, including diagnosis, preventive care, patient education, and treatment. Outcome assessment entails all impacts of health care on patients.

With HIT as the main variable in the study, the literature review showed varying relationships between HIT and variables like health care quality, outcome, and cost. The review showed that HIT has the potential to enhance the quality of health care services through enhanced safety and efficiency. Health information technology improves the health care outcome, which entails various elements including not only patient-centered outcomes but also organizational goals and objectives about structures and processes. Using HIT ensures appropriate information is available to various stakeholders within the health care system at all stages of the health care process.

Health information technology helps to improve communication during transitions between health care providers, caregivers, community support groups, and patients. Health information technology impacts health care outcomes around emergency response and positively impacts job design by creating a framework for aligning members of the workforce with their roles, systems, and resources. Health information technology also reduces the cost of health care, though its development, implementation, and adoption are an equally expensive undertaking. At lower levels and short-term

periods of HIT investment, health care providers' institutions encounter rising operating expenses as opposed to higher levels and long-term period of HIT's adoption. In return for HIT investment and applications, leaders of non-profit-making health care institutions and hospitals seem to realize a smaller cost-reduction impact than leaders of profit-making hospitals.

Various HIT applications in the literature included MediTech, telemedicine, GE Centricity, iTriage, and iPortal. MediTech refers to the electronic transmission of medical information to sustain and enhance the health status of patients through its technologies for storing and forwarding medical documents and images, secure messaging, data exchange, remote monitoring of patients' health status, medical reminders, and alerts. Telemedicine best suits the current medical environment due to the shortage of health care professionals and increased cases of chronic health conditions, as well as increasing health care costs on the patient's side to ensure maximum use of available health care specialists through real-time videoconferencing or teleconferencing. Using telemedicine and telecommunications leads to reduced use of emergency rooms, improved health care outcomes, cost savings, improved access to health care providers, and increased patient satisfaction, all based on wireless and telemonitoring technologies.

GE Centricity is software used to acquire and store medical images as well as other information objects. The software allows different users to have various methods of exporting information, including sending images and other objects to external systems over the network, as well as desktop integration with different information systems. The iTriage technology helps patients to get answers to common medical questions in health

care sectors, including knowing what could be wrong with one's health and where to go for the treatment. Using the iTriage Appointment Setting helps health care providers to have convenient appointment scheduling, thereby driving more patient traffic; enhancing patients' experience; increasing the number of patients seeking specific medical services; increasing operational efficiencies, satisfaction, and retention; and improving competitive advantage over competitors.

The iPortal offers a secure, compliant, two-way communication pathway between patients and their respective health care providers and provides a convenient, 24-hour, self-service option for the patients. The iPortal delivers functions such as clinical messaging, electronic prescription requests and refills, patient demographic updating, test result alerts, secure provider posting of medical information, and automatic appointment scheduling. iNotify provides opportunities for substantial improvement of health care processes through a unified communication framework between providers and patients. The technology provides precise and prompt communication among health care providers, enhanced coordination among providers in delivering daily tasks, and improved access to information for decision making.

A large amount of clinical literature included discussions on the benefits of rapid medical intervention for health outcomes. Research outside the health care sector on the impact of IT on organizational performance and effectiveness provided a compelling argument for the potentials of IT. The studies showed that the impact grows over a period of years after the initial IT investment. Health information technology has the potential to revolutionize health care delivery by making it more effective, more efficient, and safer.

The next chapter includes a discussion of the research method selected, various research approaches, and a synthesis of alternative research methods. Additionally, the chapter contains a description of the methods considered for the research, the research design, and instrumentation. Finally, the chapter contains a discussion of data types, collection procedures, ethical considerations, and the expected outcomes of the study.

Chapter 3: Research Method

Introduction

The purpose of this study was to explore the potential relationship between HIT and organizational effectiveness, based on a survey of health care providers. The previous chapter that contained a review of literature relevant to the study topic included a discussion of objectives and questions. This chapter includes a discussion on (a) research questions and hypotheses, (b) research design, (c) appropriateness of design, (d) population and sampling procedure, (e) ethical protection of research participants, (f) data collection and instrumentation, (g) reliability and validity, and (h) data analysis. Also discussed is the usefulness of the study to the field of management in general and health care in particular, and an explanation of why alternative methods would not be appropriate. Additionally, the discussion included the approaches that researchers use to arrive at various conclusions, followed by a synthesis of alternative research methods, which leads to selecting the quantitative correlational design in this study to achieve the research goals of understanding the relationship between HIT and organizational effectiveness from health care providers' perspectives.

The research questions and hypotheses for this study were as follows:

Research Question 1: What is the relationship, if any, between the adoption of HIT and organizational effectiveness?

$H1_0$: There is no statistically significant relationship between the adoption of HIT and organizational effectiveness.

$H1_a$: There is a statistically significant relationship between the adoption of HIT and organizational effectiveness.

Research Question 2: What is the relationship, if any, between the adoption of HIT and exchange of information?

$H2_0$: There is no statistically significant relationship between the adoption of HIT and exchange of information.

$H2_a$: There is a statistically significant relationship between the adoption of HIT and exchange of information.

Research Question 3: What is the relationship, if any, between the adoption of HIT and organizational process?

$H3_0$: There is no statistically significant relationship between the adoption of HIT and organizational process.

$H3_a$: There is a statistically significant relationship between the adoption of HIT and organizational process.

Research Question 4: What is the relationship, if any, between the adoption of HIT and organizational productivity?

$H4_0$: There is no statistically significant relationship between the adoption of HIT and organizational productivity.

$H4_a$: There is a statistically significant relationship between the adoption of HIT and organizational productivity.

Research Question 5: What is the relationship, if any, between the adoption of HIT and patients' direct personal care?

$H5_0$: The There is no statistically significant relationship between the adoption of HIT and patients' direct personal care.

$H5_a$: There is a statistically significant relationship between the adoption of HIT and patients' direct personal care.

Research Design

Researchers broadly categorize research approaches as quantitative and qualitative. Within the two categories are sub-approaches that include interpretive, subjective, objective, and philosophical methods (Saunders et al., 2003). Philosophical use of theory refers to an empirical phenomenon that is not easy to measure. I employed an objective approach. An objective approach allows for generalization of the participants' responses in line with the research question. This generalization is common with a quantitative approach in which researchers use survey questionnaires to gather participants' views. Using an objective approach leads to strong research outcomes because researchers make the conclusions based on what actually exists rather than on subjective speculations of their subjects' thoughts.

The interpretive, subjective, and philosophical approaches are not appropriate for this study. The basis of the argument for interpretive, subjective, and philosophical approaches is that people can best understand a social phenomenon by considering feelings and insights that exist only in the mind rather than using laws of nature (Saunders et al., 2003). However, understanding the relationship between IT and organizational effectiveness requires concrete proof of evidence. Therefore, an objective approach was more appropriate for the study.

Quantitative study involves quantitative data. Quantitative data can be a product of many research strategies ranging from simple counts such as frequency of occurrence to more complex data such as test scores or prices. Researchers can collect and subsequently code data for quantitative analysis at different levels of numerical measurement (Myers, 2009). Quantitative studies follow a generalization approach to make conclusions based on expressed views, and researchers use questionnaires and physical counts to enter numerical values against expressed ideas. This type of study includes statistical software tools and functionalities to process and analyze data to arrive at generalized results.

The quantitative design in this research involved utilizing a questionnaire to collect answers to research questions testing how the various variables correlate to one another in the delivery of health care and other organizational roles and functions. The study variables were HIT, organizational effectiveness, organizational productivity, organizational process, organizational exchange of information, and personal care. The quantitative approach mainly involves numbers to yield specific estimates and differences. The study involved gathering, summarizing, filtering, and analyzing data to find answers to the study research questions and thus meet the study objectives. Toward that end, the study included a quantitative correlational design utilizing a convenience sampling technique. A convenience sampling method was cost efficient and more practical for the study due to financial and time constraints. Sampling is further discussed under population and sampling.

Appropriatenesss of Design

Correlational analysis was selected as a first step towards understanding where to focus and what variables to consider in a future causal analysis because there is a need to show the relationship between HIT and organizational effectiveness, but a causal model cannot be easily determined without this first step. The correlational design, being quantitative in nature, also matches the nature of the quantitative data type in the study. Hence, a quantitative correlational design was appropriate for investigating the relationship between the use of HIT and organizational effectiveness. The study did not involve making predictions or looking at causes and effects. The following section contains highlights of some alternative research approaches that received consideration for the study.

Field Work

I did not use the fieldwork method in this study. Enquiry or the inductive approach (Saunders, Lewis & Thornhill, 2007) is the basis of the fieldwork approach that can be scientific or traditional (McBurney & White, 2009). Fieldwork was not appropriate for the study because the study did not require direct and concrete experiences based on real-world observations.

Action Research

I did not use action research in the study. Action research involves the engagement of a researcher with an aim to influence change in a situation (Myers, 2012). The action researcher aims to monitor and assess the outcomes of the situation. Action research was not be appropriate for the study because my goal was not to change the way

leaders of health care organizations perceive, understand, adopt, and sustain HIT and its organizational effectiveness. Further, the action research method needs active cooperation between the clients (HIT adopters) and the researcher, as well as continual adjustment processes (Cozby, 2009). The study did not include such interactions but will maintain a focus on determining the relationship, if any, between HIT and organization effectiveness.

Grounded Theory

I did not use grounded theory in this study. Grounded theory method includes a major focus on generating theory from collected and analyzed data (Miller & Fredericks, 2006). Using grounded theory does not involve challenging already-established theories regarding a certain practice or situation (Woolley, 2008). Rather, researchers develop theory from their actual observations and do not make assumptions before conducting the study. Thus, the grounded theory method does not support using assumptions and hypotheses to arrive at conclusions, which made it unsuitable for this study.

Ethnography

The ethnographic research method entails a researcher using participant observations and becoming a working member of the group or situation under observation (Sarantakos, 2005). This method was not appropriate for this study due to time, financial, legal, and business constraints. Ethnography includes an aim to understand the participants and situation from inside based on the views of the involved parties. This paradigm is only suitable in studying small firms and small groups

(Creswell, 2009), which would not be appropriate in this study because participants from large health care organizations were expected to participate.

Critical Theory

Critical theory method was not appropriate for this study, as its basis is the concept that humans are potentially active agents in the construction of their social world as well as their personal lives (Suri & Clarke, 2009). The method does not rely on assumptions and subjective conceptualizations, but on active and reflective reasoning (Saunders et al., 2009). The method does not employ any preformed assumptions and theories, but involves developing conclusions at the end of the study through reflective approaches (Denzin & Lincoln, 2006). A reliable critical theory development in this study would therefore require a dialogue between the health care providers and the researcher. For the above reasons, critical theory method was not appropriate for the study.

Case Study

I did not use case study method in this study. Case studies are analyses of persons, events, decisions, periods, projects, policies, institutions, or other systems that researchers study holistically using one or more methods (Thomas, 2011). A descriptive case study did not make sense for this study because it would involve exploring causation to determine the principles related to the study (Leedy & Ormrod, 2005). A case study was not appropriate because that would only elicit interpretive responses to a particular variable relationship and the proposed study involves many such relationships. Additionally, a case study involves exploring answers to questions of why or how

(Simon, 2011), whereas this study involved an attempt to answer questions about the relationship, if any, among variables.

Population and Sampling

The participants were selected from a population of 1,375 healthcare workers who are using HIT. HIT consisted of these set of systems: Computerized Physician Order Entry (CPOE), Clinical Decision Support System (CDSS), Electronic Health Record System (EHR), Picture Archiving and Communications Systems (PACS), and applications such as Meditech, GE-Centricity, iPortal, telemedicine, iNotify, and iTriage. Administrators at the research site gave me a set of users who are using these systems. It was imperative to choose pioneer health care organizations as well as those with recent establishment history. The focus was on not for-profit health care organizations. A convenience sampling of workers who meet the following criteria were eligible to participate in the study: (a) are 18 years or older ,(b) perform work for the organization on a full time or part time basis, (c) are either a physician, nurse, pharmacist, dentist, radiologist, managerial staff, subordinate staff, (d) and are using HIT. The participants received a link to an anonymous self-administered online survey.

I used a convenience sampling method, which is a form of non-probability sampling, to conduct the study. A convenience sampling method was efficient because the sample was from the available pool of self-selected responders (Gay et al., 2006). The advantage was that there were more participants in the study (Gay et al., 2006). Additionally, convenience sampling is practical when determining a relationship between

different characteristics is necessary. A convenience sampling method was also cost efficient and more practical for the study due to financial and time constraints.

Other sampling methods that I considered but did not use include snowball sampling, random sampling, stratified sampling, and cluster sampling methods. Snowball sampling would have required a small sample to get more participants with the same qualifications (McBurney & White, 2009). The study did not need one participant to refer another, and then another participant to refer still another participant (Simon, 2011). The random sampling technique involves selecting the population in such a way that each participant has an equal and nonzero chance of selection. According to Simon (2011), random sampling needs a lot of planning time to get the sampling right. Stratified sampling, in which researchers group participants into different subpopulations, was not appropriate for this study. Additionally, cluster sampling was not appropriate because there was no need to separate the participants into different clusters from which a researcher can randomly select them.

The study used the convenience sampling method because it was efficient, and the sample was derived from available self-selected responders (Gay et al., 2006, p. 569). The advantage of convenience sampling is there would be more participants in the study (Gay et al., 2006, p. 112). I preferred to use convenience sampling because of lower cost.

Sample size calculations can be complex and are a function of alpha, effect size, and statistical power. The type of statistics that was applied to the sample data and the number of variables also were factors considered. I utilized G*Power 3.1.3 software tool to calculate sample size for the Spearman rho correlation. According to Siegel (1988), the

power for a Spearman correlation is approximately 91% as efficient as a Pearson correlation. I selected the a priori option and a medium effect size, alpha of .05, and an increased power of 0.95 to have a requirement of 115 participants. Thus, 115 participants was the sample size.

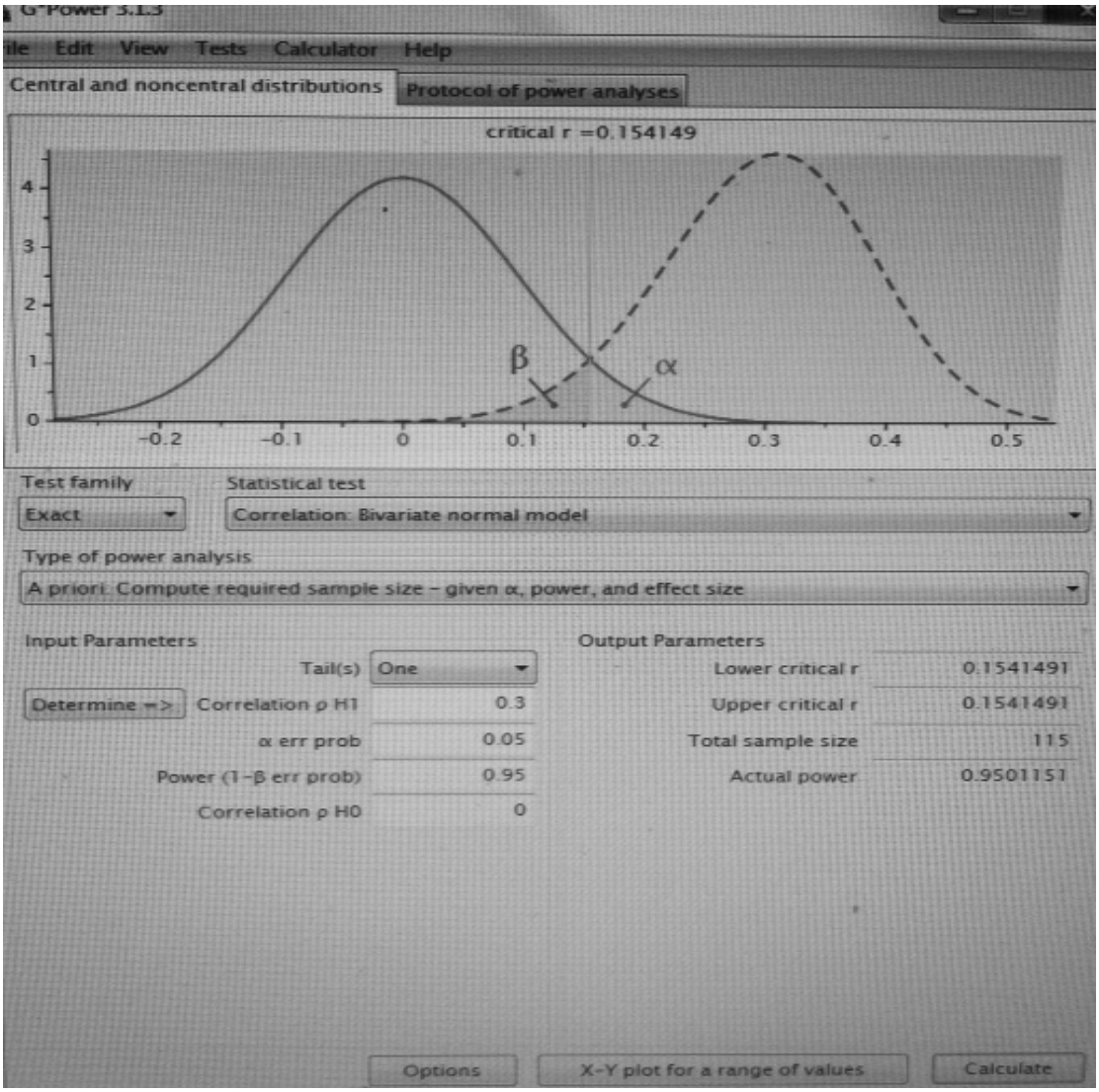

Figure 1. G*Power Calculation

Typical survey response rates are around 20%. Kittleson (1997, p. 196) emphasized the effectiveness of follow-up notices to electronic survey efforts, stating that "one can expect between a 25 and 30% response rate from an e-mail survey when no follow-up takes place." Follow-up reminders will approximately double the response rate for e-mail surveys (Kittleson, 1997, p. 196). I sent out 1,375 surveys. With one follow-up reminder, I got a response rate of approximately 13%. The sample population was representative of the whole population.

To ease the analysis process, I worked with a small, but adequate, sample instead of an unnecessarily large sample (Saunders et al., 2009). The first step in the sampling process required brainstorming on the types of stakeholders who might have an interest in adopting HIT, as well as those who have reliable experience while using HIT in providing health care services. This prompted me to develop a list of stakeholders in health care provision, including primary and secondary providers. I considered primary health care providers such as nurses, physicians, and pharmacists because they directly interact with HIT. Secondary providers considered included other health care staff and management whose use of HIT systems in one way or another can contribute to organizational effectiveness. The mix of participants was appropriate given that primary health care providers, as well as secondary players in the providers' organizations, should notice any impact of HIT on health care outcomes. The internal stakeholder was from a for-profit health care institution with a long history of HIT adoption and use.

While choosing the participants for the study, my focus was on those people who have served in the health care sector for at least 1 year, as I perceived them to have

experience with technological advancement and adoption in the health care sector. I chose 116 participants from various health care departments such as paediatric care, ambulatory care, and cardiac-related care. The subordinate staff and managerial staff were also from various departments as is the case of the primary participants.

Ethical Protection of Research Participants

Because the data needed to complete this study may be sensitive to the operations of hospitals as well as to the safety and privacy of patients, the study needed to proceed carefully with regard to ethical conduct and approach (Srivastava & Hopwood, 2009). Therefore, I conducted the study in an ethical and responsible manner and in accordance with Walden University's Institutional Review Board guidelines. This study only included respondents who voluntarily agreed to participate. To assure this goal, every respondent received a consent form for participation to ascertain voluntary participation in the survey. I asked the respondents to consent by clicking consent on the survey link and by completing the survey. In the consent letter, the participants were also able to opt out from the survey if they wished. Emergency assistance program numbers were made available for participants on the consent form.

I ensured complete anonymity and privacy of the respondents. No individual response was available to the public. I reported and published only general findings based on the analysis and summary of all the data. I also explained to every participant that this was academic research and I used participants' responses only for academic purposes and not any other purpose that may reflect on the hospital's, organization's, or a participant's personal image in any manner. I protected the privacy of all respondents by not revealing

the accessed data to any third party. The introductory note in the questionnaire included this assurance. I ensured the anonymity of the hospitals and other health care institutions used in the study. To achieve anonymity and privacy, I employed a strong coding framework so that no third party could use the reported results to identify the details of respondents and their organizations. I ensured the raw data collected from the survey questionnaires remained saved in a secured password protected personal computer for at least five years to await further analysis.

Instrumentation

Items measuring the variables in the study were derived from an extensive review of past research on organizational relationship in IT. Scale items adapted from multiple instruments with established reliability and validity were utilized. I explored the relationship between Health IT (HIT) and each one of these variables (organizational effectiveness, exchange of information, process, productivity, and personal care). Each one of these was measured separately and was included in a different correlation/hypothesis. For example, hypothesis 1 examined the relationship between HIT and organizational effectiveness.

OES

Organizational effectiveness was operationalized using the 5-facet scale of the Organizational Effectiveness Scale (OES). OES was developed by Rotondi (1975) to measure employee effectiveness within organizations. The instrument may be reproduced and used for non-commercial research and educational purposes without seeking written permission (See Appendix D). OES uses Likert-type scale items to assess organizational

effectiveness of employees. The scale items relating to effectiveness are Stability, Integration, Voluntarism, and Achievement. The effectiveness score was computed by combining and averaging the judgments of all the raters. Organizational Effectiveness Scale is a validated instrument extensively used in organizational and academic research studies. Using non-managerial personnel for the sample, the scale reliability is acceptable (r = .73). The scale items that were used to measure organizational effectiveness are presented in Table 1.

Table 1

Organizational Effectiveness Scale Items

Organizational effectiveness
1. Efficiency of co-workers in carrying out task assignments
2. Adaptability of co-workers to changes in task requirements
3. Involvement of co-workers in interpersonal conflicts impeding task progress
4. Job satisfaction expressed by co-workers
5. Success of co-workers in achieving task goals

CQ

Organizational exchange of information captures the flow and direction of information within the organization. Exchange of information in organizations is bidirectional from the top down, bottom up, and across sections. Organizational exchange of information was measured using five scale items adapted from O'Reilly (1974). Permission is not required to use the instrument for research and teaching purposes (see Appendix E). According to Roberts and O'Reilly (1974), the purpose of the

Communication Questionnaire is to allow respondents to summarize their own communication over time. CQ is a 35 Likert-type item, self-report measure of respondent perceptions of communication dimensions. CQ scale items include trust, influence, mobility, desire for interaction, directionality of communication, accuracy, summarization, gate-keeping, overload, satisfaction, & modalities - written, face-to-face, telephone & other. Items were scored on 7-point scales. A mean score was calculated for exchange of information. Reliability and validity were established. Table 2 depicts the scale items for the study.

Table 2

Organizational Exchange of Information Scale Items

Exchange of information
1. Of the total time you engage in communications, what percentage of the time do you use the following methods to communicate:
2. When receiving information from the sources listed below how accurate would you estimate it usually is:
3. How often do you find the amount of available information hinders rather than helps your performance in this organization?
4. Do you feel that you receive more information than you can efficiently use in this organization.
5. How desirable do you feel it is in your department to interact frequently with:

OPS

Organizational processes are those workflow activities of organizational sub-units that enable consistent process performance across an organization. Organizational process was measured using five scale items adapted from Hylton (2013) and presented

in Table 3. According to Hylton (2013), the instrument was designed to aid in closing a gap in the field of leadership studies relative to the impact that a leader's commitment to following processes has upon organizational success. Permission to use the instrument was granted (see Appendix B).The research conducted by Hylton (2013) indicated that the purpose of the OPS is to obtain an assessment of formal, documented, organizational processes and leadership behaviors relative to those processes. The OPS is a 14 item, 10-point Likert-type scale instrument. The scale items for the current study were scored on 5-point scales. The objective was to improve the understanding of organizational leadership behaviors relative to organizational process. The results from OPS were used to evaluate organizational commitment to following processes as measured by stakeholder perceptions. The instrument was applied in a test-retest sequence to a sample of participants from the business or industrial arena without regard to age, gender, or ethnicity. The data were analyzed consistent with approaches developed by leaders in the development of measurement instruments to examine the instrument for content validity and temporal reliability. The average of all the items was taken to create an organizational process score. The higher the OPS score, the higher the commitment to organizational process.

Table 3

Organizational Process Scale Items

Organizational Process
1. To what extent does your organization have a set of organizational processes, that is, a documented series of logically related tasks or steps which describe the division of labor, the specialization of skills, the individual steps, and the decision points, which guide your organizational operations through a structured set of activities designed to achieve a desired result
2. To what extent do you believe that closely adhering to a set of fixed organizational processes would benefit or not benefit your organization in its efforts to meet its goals and objectives
3. To what extent does your organization's leadership ensure that set organizational processes are adhered to
4. To what extent does the leadership of your organization demonstrate a philosophy of commitment to continuous improvement of fixed processes and to following the fixed processes which are in place
5. To what extent does following fixed organizational processes benefit or not benefit your organization's efforts to obtain customer satisfaction

PS

Organizational productivity has no appropriate concept and definition that scholars can agree on. Pritchard (1991) discovered that the term productivity was used diversely ranging from organizational efficiency, individual performance, cost effectiveness, production profitability, efficiency, output, motivation, to performance appraisal. According to Harris (1994), in the systems model of organizational performance, productivity is one of the seven interrelated and interdependent criteria of organizational performance, which include productivity, efficiency, effectiveness, quality, profitability, innovation, and quality of work life. Organizational productivity

was measured using five scale items adapted from McNeese-Smith (1995). Permission to use the instrument was granted (see Appendix C). McNeese-Smith (1995) indicated that productivity should be measured by multiple indicators including goal attainment, cost of labor and supplies, quality of service, employee growth, hours of care per unit of service, amount of work, deadlines, work organization, errors, sick leave, turnover, and problem solving. The items were constructed into 15 statements about employee's contribution to productivity, using a 5-point Likert-type scale (1 = slight contribution; 5 = high contribution). The questionnaire went through several iterations with feedback from the original panel of judges, other department managers, and a cross-section of hospital staff. Finally, a test for reliability was conducted among a sample of 20 hospital employees, followed by a retest after 7 weeks. Stability was demonstrated with test-retest reliability at r= 0.95. Internal consistency also was demonstrated using Cronbach's alpha (0.90 to 0.93). The mean of all the items was taken to create a productivity score. Higher score means higher productivity. Table 4 depicts the scale items used to score the organizational productivity.

Table 4

Organizational Productivity Scale Items

Organizational Productivity
1. Helping to meet overall hospital goal
2. Providing a high quality of service in my department
3. Assisting my department to meet its productivity goal
4. Helping to accomplish a large amount of work in my department
5. Helping my department to be accurate/free of errors.

PPOS

Personal care describes the types of patient–practitioner relations in health care settings. Five scale items adapted from Krupat et al. (1999) were used to measure personal care. Permission to use the instrument was granted (see Appendix A). The 6-point scale is laid out from left to right as strongly disagree (scored 6) to strongly agree (scored 1). One mean score was calculated for the five items. The Total Score ranges from "patient-centered" to "doctor-" or "disease-centered." The higher the score shows the more patient-centered the orientation. Item 4 is reverse- worded, and scoring was reversed. Previous research has shown that the PPOS has good reliability ($\alpha = 0.75$ to 0.88) and validity. Table 5 depicts the scale items used to measure direct personal care.

Table 5

Personal Care Scale Items

Personal care
1. Although health care is less personal these days, this is a small price to pay for medical advances
2. Patients should rely on their doctors' knowledge and not try to find out about their conditions on their own
3. The doctor is the one who should decide what gets talked about during a visit
4. Patients should be treated as if they were partners with the doctor, equal in power and status
5. When patients look up medical information on their own, this usually confuses more than it helps

Data Collection

Data was a crucial part of the success of the study. The types and amount of data collected created a foundation on which I made conclusions. In fact, it was not only the data types and sources that helped the study realize success, but also the data collection approach that helped to achieve high accuracy and reliability.

I used the survey questionnaire to carry out the survey among the respondents. The self-administered electronic survey used to collect data included Organizational Effectiveness Scale survey, Communication Questionnaire, Organizational Process Scale, Patient-Practitioner Orientation Scale, and the Productivity Scale instrument. Using a survey questionnaire offered a relatively less expensive and more convenient data collection option, as I sent the questionnaires to the participants to complete in my absence, in order to avoid disruption of their normal operations. The questionnaire was appropriate as a data collection technique for the study because of the quantitative nature

of data needed and the benefits of questionnaires over other methods (Rubin & Rubin, 2005). Using a survey questionnaire can bring flexibility and convenience to a study, and electronic survey technologies helped me save resources.

The study instrument was adapted from five existing survey questionnaires used with permission from the authors (Appendices A-E). These instruments included lists of closed-ended questions (Srivastava & Hopwood, 2009) formed using a Likert-type scale, which provided a ranking mode for respondents to give their opinion. Participants self-administered the survey (Srivastava & Hopwood, 2009). Every respondent received a questionnaire through e-mail with a link to the survey and then answered the questions in my absence. The online approach was used to administer and receive all the completed survey questionnaires. I employed the online approach, as some respondents may not have been accessible in person for the study. The online approach offered increased flexibility and availability of respondents. The online approach also helped save time and cost (Zikmund, 2003). The hospital administrators e-mailed the questionnaire, which took a short time, and there was no need to travel to the respondents' place of work to conduct the survey.

The design of the survey questionnaire served to capture study information. Frequency and percentages were used to measure categorically scaled variables, and range to measure continuously scaled variables. The questionnaire captured respondents' perceptions on the general impact of HIT on organizational effectiveness and direct patient personal care. More specifically, the second part of the questionnaire captured the providers' views on the impact of HIT on health care cost, outcome, and quality. The

design of the questionnaire required much attention in making the questions as simple and as self-explanatory as possible (Saunders et al., 2009) so that they would not result in difficulties in interpretation in the absence of the researcher. Thus, I formulated the questions in simple English using familiar health care, personal care, HIT, and organization effectiveness terms that enabled the respondents to provide adequate and reliable responses to every survey question. The questionnaire had closed-ended questions to reduce or prevent irrelevant responses. The survey consisted of the electronic survey factors listed in Table 1.

Table 6

Factors of the electronic survey

Factor	Description
Organizational effectiveness	Organizational Effectiveness scale
Organizational exchange of information	Communication questionnaire
Organizational process	Organizational Process survey
Organizational productivity	Productivity Scale
Personal care	Patient-Practitioner Orientation Scale

Data Analysis

I entered the data from the survey questionnaires into Statistics Solutions Pro version v1.14.12.16 and conducted statistical analysis. Frequencies and percentages were used to calculate nominal data. Means and standard deviations helped to calculate continuous data, such as organizational effectiveness, personal care, and organizational process. Again, I looked at the relationship between Health IT (HIT) and each one of these variables (organizational effectiveness, exchange of information, process, productivity, and personal care). Each one of these was measured separately and was

included in a different correlation/hypothesis. For example, hypothesis 1 examined the relationship between HIT and organizational effectiveness.

To examine hypotheses, I conducted a series Spearman rho correlation to assess the relationships among health information technology and organizational effectiveness. A Spearman correlation was the appropriate analysis to conduct when the goal was to assess the relationship between two variables when at least one of them is ordinal (Pallant, 2010). Adoption of HIT is an ordinal variable measured by a Likert-type scale, where 1 = *strongly disagree* up to 5 = *strongly agree*. Organizational effectiveness, exchange of information, organizational process, organizational productivity, and direct personal care are continuous variables.

The Spearman rho correlation served to measure the Spearman rho coefficient. Coefficient values range from -1 to +1. Negative coefficients indicate an inverse relationship, whereas positive coefficients indicate a direct relationship. Cohen's (1988) standards for correlation coefficients helped to assess the strength of the relationship. Coefficients less than .10 are very weak, those less than .30 are weak, those less than .50 are moderate, and those greater than .50 are strong.

The hypotheses related to each research question and the means of testing them are as follows:

$H1_0$: There is no statistically significant relationship between the adoption of HIT and organizational effectiveness.

$H1_a$: There is a statistically relationship between the adoption of HIT and organizational effectiveness.

To examine Hypotheses 1, I conducted a Spearman rho correlation to assess the relationship between the adoption of HIT and organizational effectiveness. A Spearman correlation is the appropriate analysis to conduct when the goal is to assess the relationship between two variables when at least one of them is ordinal (Pallant, 2010). Adoption of HIT is an ordinal variable measured by a Likert-type scale, where 1 = *strongly disagree* up to 5 = *strongly agree*. Organizational effectiveness is a continuous variable measured by the Organizational Effectiveness Scale survey. The average of the combined score provided an organizational effectiveness score.

$H2_0$: There is no statistically significant a relationship between the adoption of HIT and exchange of information.

$H2_a$: There is a statistically significant relationship between the adoption of HIT and exchange of information.

Examining Hypotheses 2 involved conducting a series of Spearman rho correlations to assess the relationship between adopting HIT and exchanging information. A Spearman correlation is the appropriate analysis when the goal is to assess the relationship between two variables when at least one of them is ordinal (Pallant, 2010). Adoption of HIT is an ordinal variable measured by a Likert-type scale, where 1 = *strongly disagree* up to 5 = *strongly agree*. Exchange of information is a set of continuous variables measured by the Communication Questionnaire. Five indices in the Communication Questionnaire used are desire for interaction, directionality—upward, directionality—downward, directionality—lateral, accuracy, overload, and satisfaction. I

measured each index on a 7-point scale. The mean of all the items provided an exchange of information score.

$H3_0$: There is no statistically significant relationship between the adoption of HIT and organizational process.

$H3_a$: There is a statistically significant relationship between the adoption of HIT and organizational process.

To examine Hypotheses 3, a Spearman rho correlation was suitable to assess the relationship between adopting HIT and organizational process. A Spearman correlation is the appropriate analysis to conduct when the goal is to assess the relationship between two variables when at least one of them is ordinal (Pallant, 2010). Adopting HIT is an ordinal variable measured by a Likert-type scale, where 1 = *strongly disagree* up to 5 = *strongly agree*. Organizational process is a continuous variable measured by the Organizational Process survey. The questionnaire included five questions, with each measured on a 7-point scale. The average of all the items provided an organizational process score.

$H4_0$: There is no statistically significant relationship between the adoption of HIT and organizational productivity.

$H4_a$: There is a statistically significant relationship between the adoption of HIT and organizational productivity.

To examine Hypotheses 4, a series of Spearman rho correlations was suitable to assess the relationship between adopting HIT and organizational productivity. A Spearman correlation is the appropriate analysis to conduct when the goal is to assess the

relationship between two variables when at least one of them is ordinal (Pallant, 2010). Adopting HIT is an ordinal variable measured by a Likert-type scale, where 1 = *slight contribution* up to 5 = *very high contribution*. Organizational productivity is a continuous variable measured by the Productivity scale. The questionnaire included five scale items, with each measured on a 5-point scale. Taking the mean of all the items provided an organizational productivity score. Higher score means higher productivity. The items included in the questionnaire are goal attainment, quality of service, productivity goal, accuracy/ and free of errors.

$H5_0$: The There is no statistically significant relationship between the adoption of HIT and patients' direct personal care.

$H5_a$: There is a statistically significant relationship between the adoption of HIT and patients' direct personal care.

To examine Hypotheses 5, a series of Spearman rho correlations was suitable to assess the relationship between adopting HIT and direct personal care. A Spearman correlation is the appropriate analysis to conduct when the goal is to assess the relationships between two variables when at least one of them is ordinal (Pallant, 2010). Adopting HIT is an ordinal variable measured by a Likert-type scale, where 1 = *strongly disagree* up to 6 = *strongly agree*. Personal care is a continuous variable measured by the Patient-Practitioner Orientation scale. The questionnaire included five scale items, each measured on a 6-point scale. I calculated one total mean score for the 18 items. The higher the PPOS score the more patient-centered the orientation.

Usefulness to the Field

The findings from the study may offer helpful information to the field of management in general and health care organizations in particular as they address the relationship between IT adoption or implementation and organizational effectiveness. The result of this study may be positive correlation between IT and organizational effectiveness, organizational productivity, organizational exchange of information, and process. The results may lead to improved, quality, timely, and effective delivery of health care to patients; enhanced access to patients; and the promotion of patients' engagement in their approach to wellness and health care.

Summary

Chapter 3 contained support for the research design, instrumentation, sample size, data collection, data analysis procedure, and interpretation and presentation of results. Further, the chapter included a brief discussion on the expected outcomes of the study and ethical issues pertaining to the study. Chapter 4 contains the detailed data analysis and results of the study and Chapter 5 includes an interpretation of the research findings, conclusions, implications for social change, and recommendations for future studies.

Chapter 4: Results

The purpose of the quantitative correlational study was to explore the potential relationship between HIT and organizational effectiveness. The specific problem was the doubts and uncertainty about the benefits of HIT adoption relative to healthcare delivery processes and outcomes. Chapter 4 includes a detailed description of how the study was conducted, the data collection measures performed, and the data analysis technique utilized. Chapter 4 also includes the data analysis results and how the findings were used to answer the research questions and to test the hypotheses.

Data Collection Process

All 1,375 members of the organization who use HIT received an invitation to participate in the study. During the following 2 weeks, 120 people attempted to complete the online survey, but only 87 respondents fully completed the survey. To achieve the needed sample size, a reminder e-mail was sent out, and paper surveys giving the SurveyMonkey link were distributed at the nursing stations. During the next 7 days, 61 more respondents attempted to complete the survey. Among the 181 total respondents, 9 declined informed consent and were omitted from the analysis. Of the remaining 172 respondents, 56 were missing items, while 116 completed the entire survey. Thus, the usable sample size for this study was $n = 116$. At 13% response rate, 116 exceeded the minimum G*Power calculation requirement of 115.

Analysis of Data

The online questionnaire data were downloaded from SurveyMonkey in an Excel spreadsheet in a comma separated values (CSV) format. The spreadsheet file was

uploaded into Statistics Pro version V1.14.12.16 for analysis and narrative interpretation. The analysis was reported in the following order:

1. Cronbach's Alpha for the Independent and Dependent Variables.
2. Descriptive statistics for independent and dependent variables.
3. Spearman's correlation analysis.
4. Data analysis and results.
5. Research Question 1 and Hypothesis 1.
5. Research Question 2 and Hypothesis 2.
5. Research Question 3 and Hypothesis 3.
5. Research Question 4 and Hypothesis 4.
5. Research Question 5 and Hypothesis 5.
6. Multiple linear regression analysis.

Cronbach's Alpha for the Independent and Dependent Variables

Cronbach's alphas were conducted for each of the independent and dependent variables. Results of Cronbach alpha reliability testing presented in Table 7 shows all variables except personal care had scale scores above .7, indicating good reliability. The Cronbach's alphas ranged from .70 to 92, and personal care had a questionable alpha score of .68. The alpha value is consistent with the variations of the respondents and demographic characteristics. Cronbach's alpha reliability was assessed using George and Mallery’s (2010) guidelines on reliability, where alpha values greater than .90 indicate excellent reliability, alpha values greater than .80 indicate good reliability, alpha values

greater than .70 indicate acceptable reliability, alpha values greater than .60 indicate questionable reliability, and alpha values less than .60 indicate unacceptable reliability.

Table 7

Cronbach's Alpha Reliability Testing Results for the Variables

Variable	Cronbach's alpha (n =	Number of items
Organizational Effectiveness	.83	5
Exchange of Information	.83	8
Organizational Process	.83	5
Organizational Productivity	.92	5
Personal Care	.68	4

Descriptive Statistics for the Independent and Dependent Variables

Table 8 shows descriptive statistics for organizational effectiveness, exchange of information, organizational process, organizational productivity, personal care, and health information technology scores. For Organizational Effectiveness, observations ranged from 1.00 to 5.00, with an average observation of 3.49 (*SD* = 0.76). For Exchange of Information, observations ranged from 2.75 to 7.00, with an average observation of 5.27 (*SD* = 1.03). For Organizational Process, observations ranged from 2.20 to 7.00, with an average observation of 5.34 (*SD* = 1.04). For Organizational Productivity, observations ranged from 1.20 to 5.00, with an average observation of 3.83 (*SD* = 0.81). For Personal Care, observations ranged from 1.20 to 5.00, with an average observation of 2.98 (*SD* = 0.91). For Health Information Technology, observations ranged from 1.00 to 5.00, with an average observation of 3.79 (*SD* = 0.85). Means and standard deviations for continuous variables are presented in Table 7.

Table 8

Descriptive statistics for Dependent and Independent Variables (N = 116)

Variable	*Mean*	*SD*	*Min*	*Max*
Organizational	3.49	0.76	1.00	5.00
Exchange of	5.27	1.03	2.75	7.00
Organizational Process	5.34	1.04	2.20	7.00
Organizational Productivity	3.83	0.81	1.20	5.00
Personal Care	2.98	0.91	1.20	5.00
Health Information Technology	3.79	0.85	1.00	5.00

Spearman Correlation Analysis

A Spearman correlation matrix was created among organizational effectiveness, exchange of information, organizational process, organizational productivity, personal care, and health information technology. Since each variable was used five times, a Bonferroni correction to the alpha level was used; thus the new alpha level is .010 (.050 / 5). It was shown that organizational effectiveness was significantly positively correlated with organizational process, organizational productivity, and health information technology. Exchange of information was significantly positively correlated with organizational process and health information technology. Organizational process was significantly positively correlated with organizational productivity and health information technology. Table 9 shows the full correlation matrix. Figure 2 shows the scatter plot matrix among the variables.

A significant positive correlation indicates that as one variable tends to increase, the other variable also tends to increase.

Table 9
Correlation Matrix Among Organizational Effectiveness, Exchange of Information, Organizational Process, Organizational Productivity, Personal Care, and Health Information Technology

	1	2	3	4	5	6
1 = Organizational Effectiveness	-					
2 = Exchange of Information	.16	-				
3 = Organizational Process	.29*	.43*	-			
4 = Organizational Productivity	.32*	.15	.37*	-		
5 = Personal Care	.19	-.06	-.09	.01	-	
6 = Health Information Technology	.80*	.26*	.32*	.23	.10	-

Note. * $p \leq .010$.

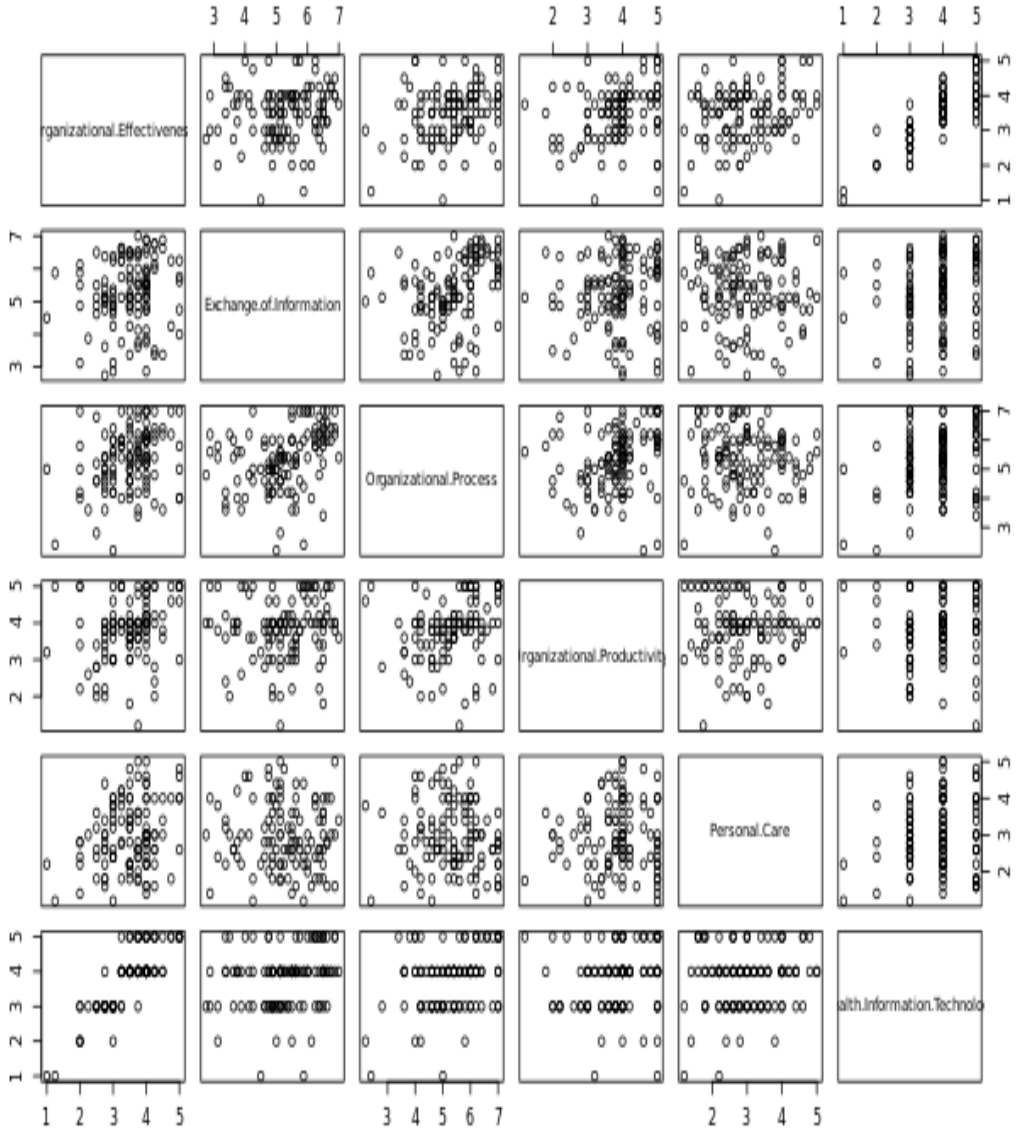

Figure 2. Scatter plot matrix between Organizational Effectiveness, Exchange of Information, Organizational Process, Organizational Productivity, Personal Care, and Health Information Technology

Data Analysis and Results

Research Question 1 and Hypothesis 1

Research Question 1: What is the relationship, if any, between the adoption of HIT and organizational effectiveness?

$H1_0$: There is no statistically significant relationship between the adoption of HIT and organizational effectiveness.

$H1_a$: There is a statistically significant relationship between the adoption of HIT and organizational effectiveness.

A Spearman correlation matrix was created among Organizational Effectiveness and Health Information Technology. It was shown that Organizational Effectiveness was significantly positively correlated with Health Information Technology. Table 10 shows the full correlation matrix. Figure 3 shows the scatter plot matrix among the variables.

A significant positive correlation indicates that as one variable tends to increase, the other variable also tends to increase.

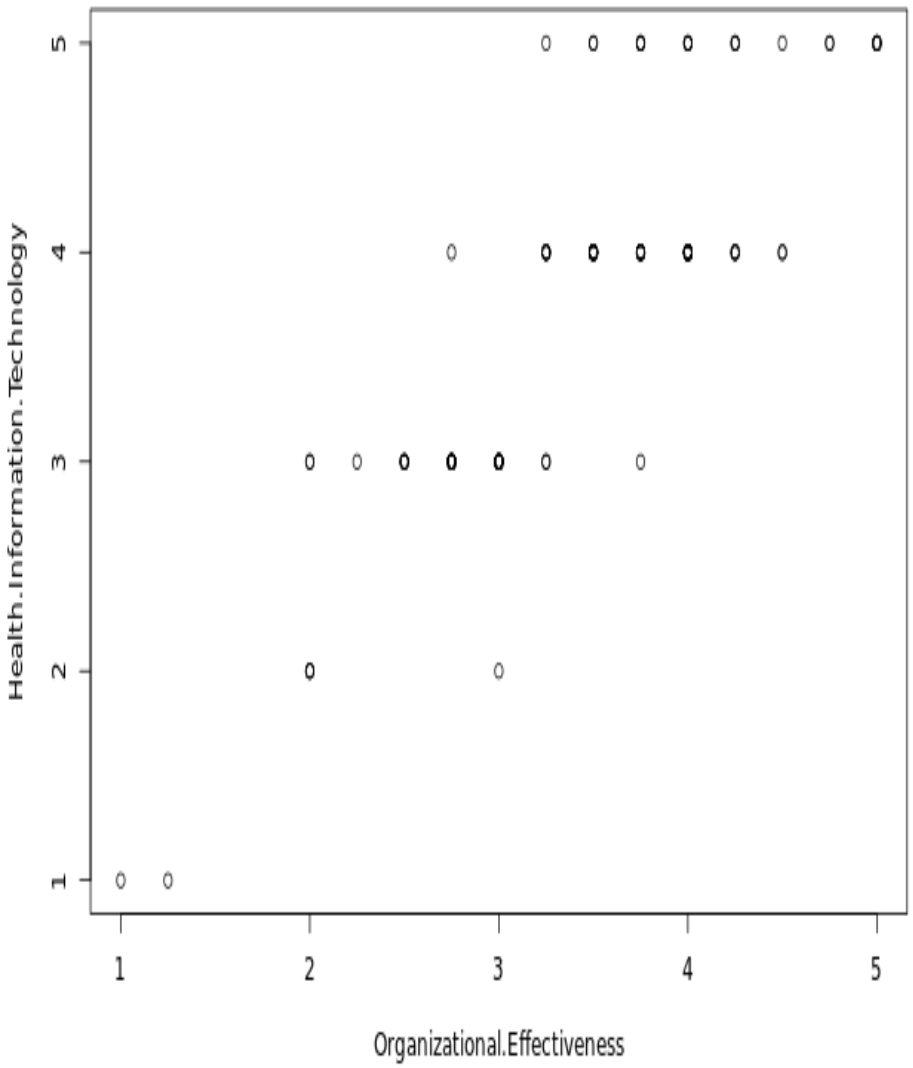

Figure 3. Scatter plot matrix between Organizational Effectiveness, and Health Information Technology.

Table 10 shows there was a statistically significant positive correlation between organizational effectiveness score and health information technology score, $r = .80$, $p < .001$. Therefore, the null hypothesis was rejected. It was concluded that healthcare

providers who perceive greater adoption of HIT tend to perceive their organization to have a greater level of organizational effectiveness.

Table 10

Correlation Matrix between Organizational Effectiveness and Health Information Technology

Spearman's Correlation Statistic for Organizational Effectiveness Versus Health Information Technology	
Correlation coefficient for organizational effectiveness	.80
P value	<.001
N	116

Research Question 2 and hypothesis 2

Research Question 2: What is the relationship, if any, between the adoption of HIT and exchange of information?

$H2_0$: There is no statistically significant relationship between the adoption of HIT and exchange of information.

$H2_a$: There is a statistically significant relationship between the adoption of HIT and exchange of information.

A Spearman correlation matrix was created among Exchange of Information and Health Information Technology. It was shown that Exchange of Information was significantly positively correlated with Health Information Technology. Table 11 shows the full correlation matrix. Figure 4 shows the scatter plot matrix among the variables.

A significant positive correlation indicates that as one variable tends to increase, the other variable also tends to increase.

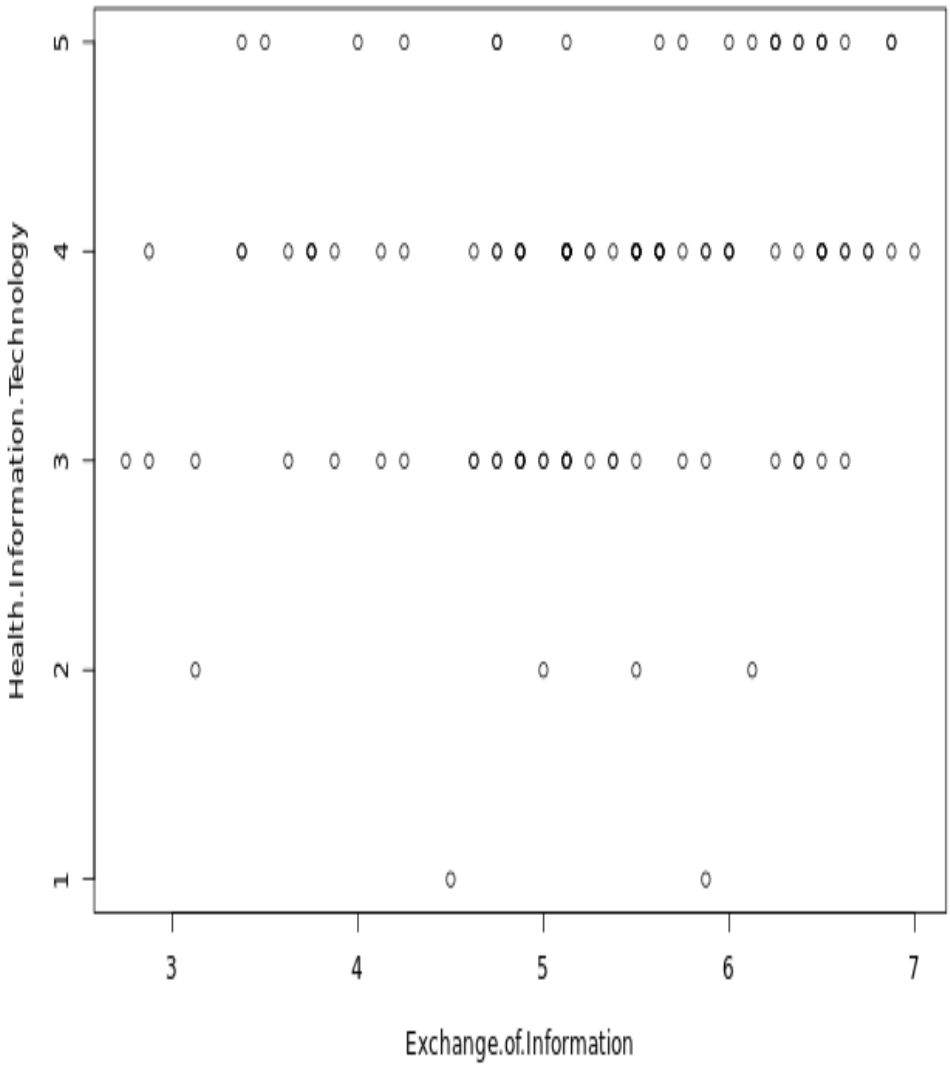

Figure 4. Scatter plot matrix between Exchange of Information, and Health Information Technology.

Table 11 shows a statistically significant positive correlation between the exchange of information score and health information technology score, $r = .26$, $p = .005$. Therefore, the null hypothesis was rejected and it was concluded that there is strong evidence to suggest that healthcare providers who perceive themselves to have a strong HIT adoption tend to have a better organizational communication.

Table 11

Correlation Matrix between Exchange of Information and Health Information Technology

Spearman's Correlation Statistic for Exchange of Information Versus Health Information Technology	
Correlation coefficient for exchange of information	.26
P value	.005
N	116

Research Question 3 and Hypothesis 3

Research Question 3: What is the relationship, if any, between the adoption of HIT and organizational process?

$H3_0$: There is no statistically significant relationship between the adoption of HIT and organizational process.

$H3_a$: There is a statistically significant relationship between the adoption of HIT and organizational process.

A Spearman correlation matrix was created among Organizational Process and Health Information Technology. It was shown that Organizational Process was

significantly positively correlated with Health Information Technology. Table 12 shows the full correlation matrix. Figure 5 shows the scatter plot matrix among the variables.

A significant positive correlation indicates that as one variable tends to increase, the other variable also tends to increase.

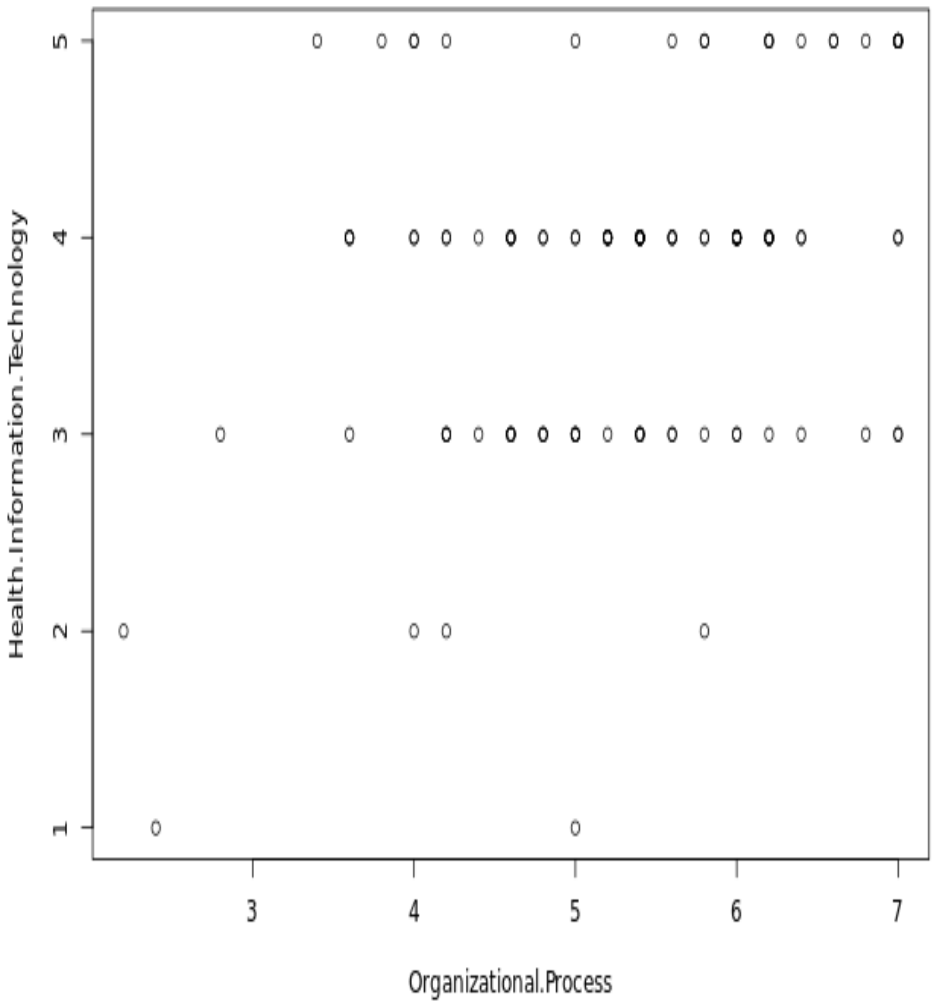

Figure 5. Scatter plot matrix between Organizational Process, and Health Information Technology.

Table 12 shows a statistically significant positive correlation between organizational process score and health information technology score, $r = .32$, $p < .001$. Therefore, the null hypothesis was rejected and it was concluded that there is strong evidence to suggest that healthcare providers who adopt HIT tend to have a better organizational process.

Table 12

Correlation Matrix between Organizational Process and Health Information Technology

Spearman's Correlation Statistic for Organizational Process Versus Health Information Technology	
Correlation coefficient for organizational process	.32
P value	<.001
N	116

Research Question 4 and Hypothesis 4

Research Question 4: What is the relationship, if any, between the adoption of HIT and organizational productivity?

$H4_0$: There is no statistically significant relationship between the adoption of HIT and organizational productivity.

$H4_a$: There is a statistically significant relationship between the adoption of HIT and organizational productivity.

A Spearman correlation matrix was created among Organizational Productivity and Health Information Technology. It was shown that Organizational Productivity was

significantly positively correlated with Health Information Technology. Table 13 shows the full correlation matrix. Figure 6 shows the scatter plot matrix among the variables.

A significant positive correlation indicates that as one variable tends to increase, the other variable also tends to increase.

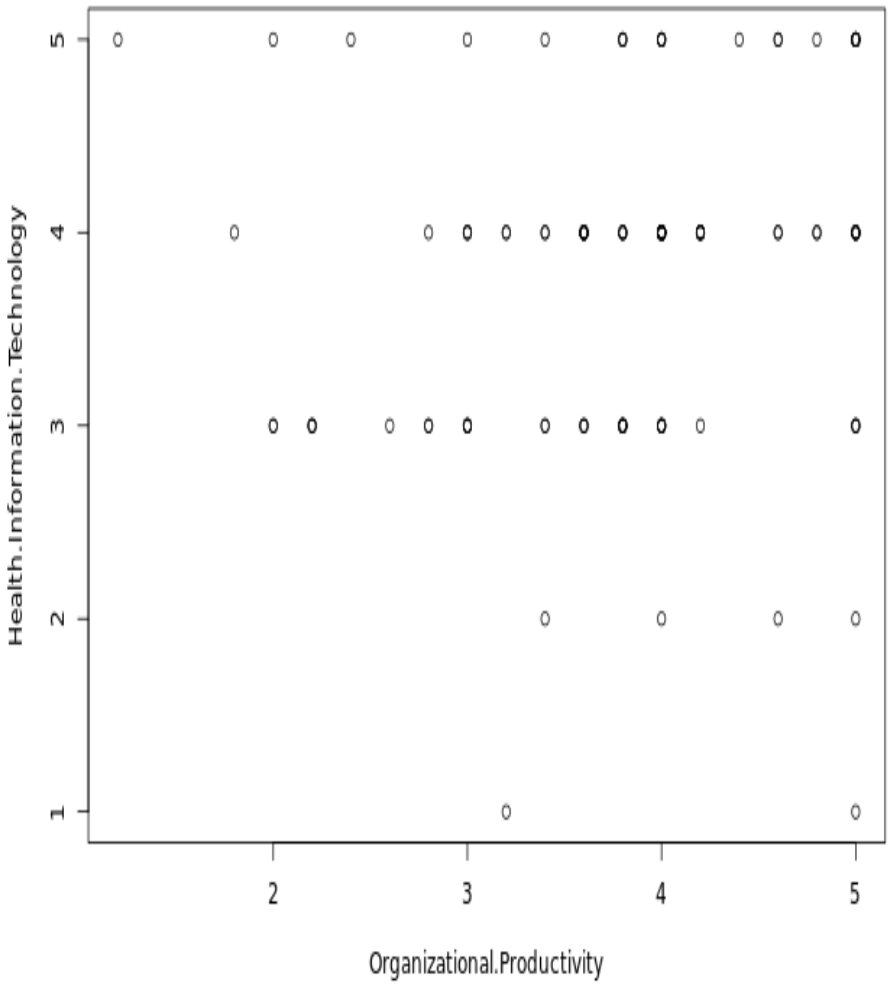

Figure 6. Scatter plot matrix between Organizational Productivity, and Health Information Technology.

Table 13 shows a statistically significant positive correlation between organizational productivity score and health information technology score, $r = .23$, $p = .004$. Therefore, the null hypothesis was rejected and it was concluded that there is strong evidence to suggest that healthcare providers who adopt HIT tend to have a higher organizational productivity.

Table 13

Correlation Matrix between Organizational Productivity and Health Information Technology

Spearman's Correlation Statistic for Organizational Productivity Versus Health Information Technology	
Correlation coefficient for organizational productivity	.23
P value	.004
N	116

Research Question 5 and Hypothesis 5

Research Question 5: What is the relationship, if any, between the adoption of HIT and patients' direct personal care?

$H5_0$: There is no statistically significant relationship between the adoption of HIT and patients' direct personal care.

$H5_a$: There is a statistically significant relationship between the adoption of HIT and patients' direct personal care.

A Spearman correlation matrix was created among Personal Care and Health Information Technology. It was shown that none of the research variables in question were significantly correlated. Table 14 shows the full correlation matrix. Figure 7 shows the scatter plot matrix among the variables.

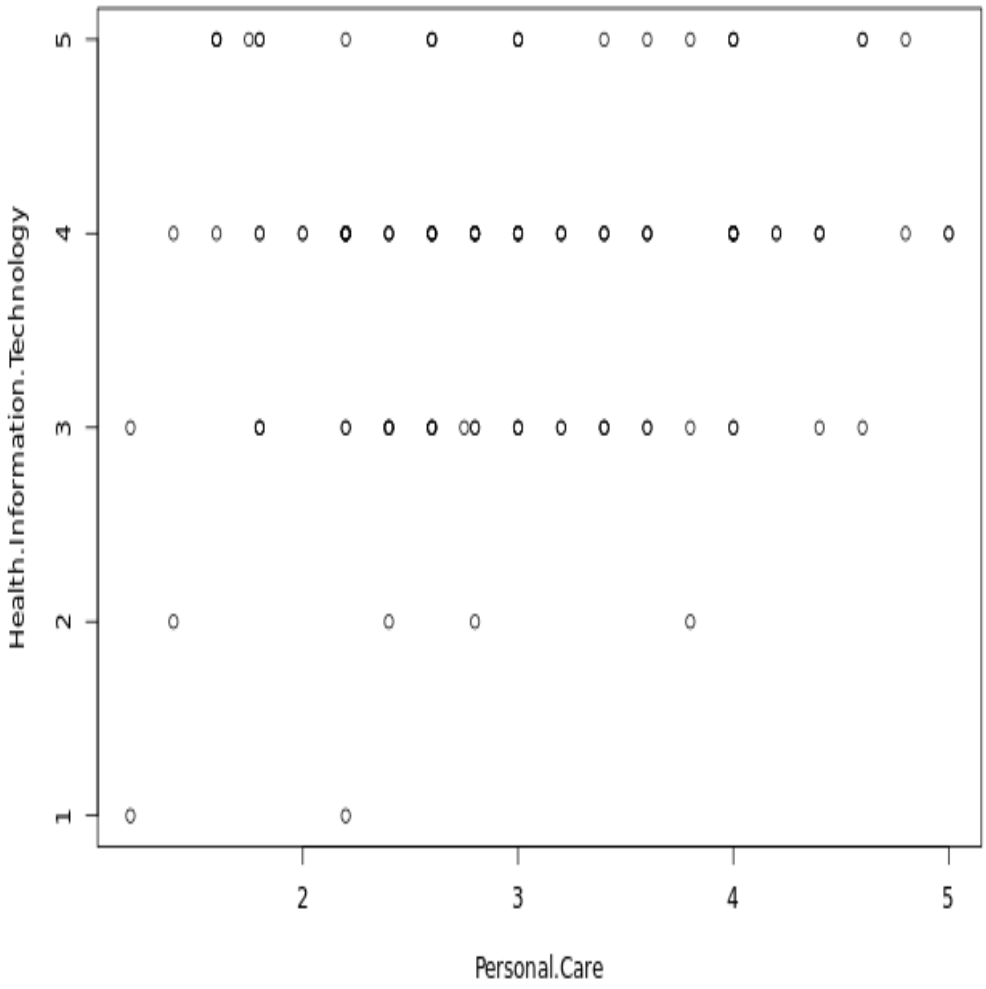

Figure 7. Scatter plot matrix between Personal Care, and Health Information Technology.

Table 14 shows no statistically significant correlation existed between personal care score and health information technology score, $r = .10$, $p = .290$. Therefore, the null hypothesis was not rejected and it was concluded that among healthcare providers, there is no statistically significant correlation between perceived personal care and HIT adoption.

Table 14

Correlation Matrix between Personal Care and Health Information Technology

Spearman's Correlation Statistic for Personal Care versus Health Information Technology	
Correlation coefficient for personal care	.10
P value	.290
N	116

Multiple Linear Regression Analysis

To further explore the relationship between the dependent variable and the independent variables, a stepwise multiple linear regression analysis was conducted. Using the stepwise method, Organizational Effectiveness, Exchange of Information, Organizational Process, and Organizational Productivity scores were still included in the model. Prior to analysis, the assumption of normality was assessed with a P-P scatter plot (see Figure 8). The assumption was met because the points did not deviate strongly from the normality line. The assumption of homoscedasticity was assessed with a residuals scatter plot (see Figure 9). The assumption was met because the points are rectangularly

distributed and the curvature line is approximately straight. Independence of observations was assessed with the Durbin-Watson statistic. The value was 2.11, which is close to the 2.00 value of all points being independent, and thus the assumption was met. Multicollinearity was assessed through the correlations conducted. No correlation among the predictors exceeded .80, suggesting no presence of multicollinearity.

The results of the linear regression were significant, $F(4,111) = 78.50$, $p < .001$, $R^2 = 0.74$, suggesting that Organizational Effectiveness, Exchange of Information, Organizational Process, and Organizational Productivity accounted for 74% of the variance in Health Information Technology. The individual predictors were examined further. Organizational Effectiveness was a significant predictor of Health Information Technology, $B = 0.92$, $p < .001$, suggesting that for every one unit increase in Organizational Effectiveness, Health Information Technology increased by 0.92 units. Exchange of Information was not found to be a significant predictor of Health Information Technology. Organizational Process was a significant predictor of Health Information Technology, $B = 0.10$, $p = .021$, suggesting that for every one unit increase in Organizational Process, Health Information Technology increased by 0.10 units. Organizational Productivity was a significant predictor of Health Information Technology, $B = -0.13$, $p = .015$, suggesting that for every one unit increase in Organizational Productivity, Health Information Technology decreased by 0.13 units. Results of the stepwise multiple linear regressions are presented in Table 15.

Table 15
Results for Multiple Linear Regression with Organizational Effectiveness, Exchange of Information, Organizational Process, and Organizational Productivity Predicting Health Information Technology.

Source	*B*	*SE*	β	*t*	*P*
Organizational Effectiveness	0.92	0.06	.83	15.92	.001
Exchange of Information	0.07	0.04	.08	1.57	.120
Organizational Process	0.10	0.04	.13	2.33	.021
Organizational Productivity	-0.13	0.05	-.13	-2.48	.015

Note. $F(4,111) = 78.50$, $p < .001$, $R^2 = 0.74$

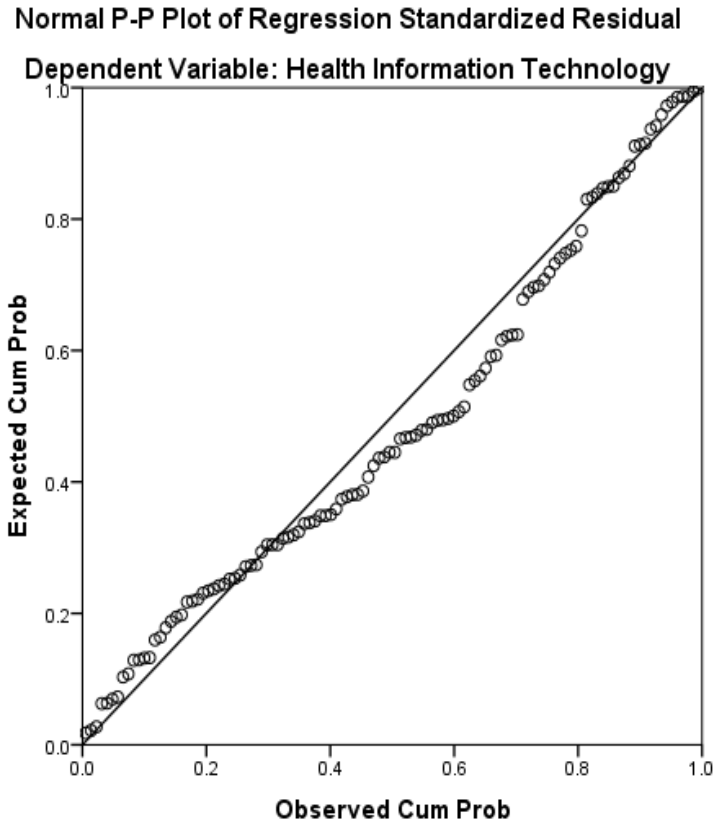

Figure 8. P-P scatter plot for normality for Organizational Effectiveness, Exchange of Information, Organizational Process, and Organizational Productivity predicting Health Information Technology.

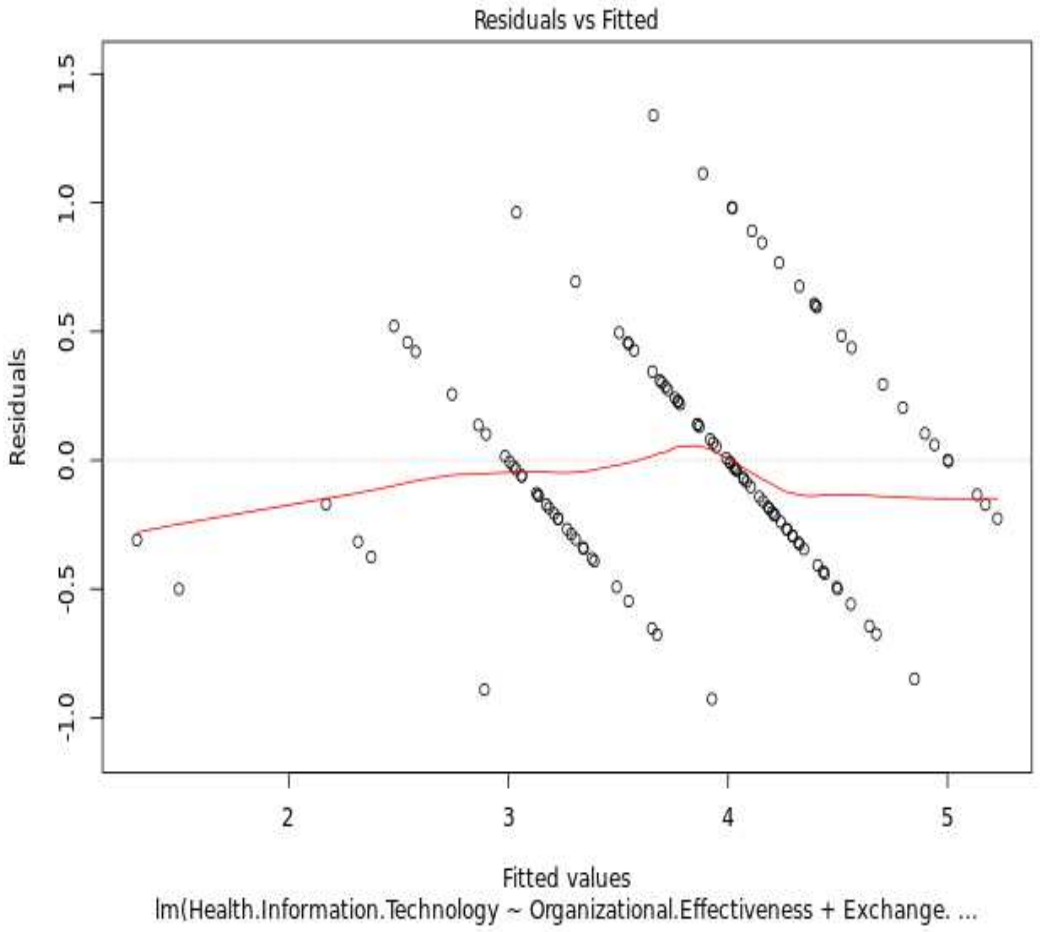

Figure 9. Residuals scatter plot for homoscedasticity for Organizational Effectiveness, Exchange of Information, Organizational Process, and Organizational Productivity predicting Health Information Technology.

Summary

The purpose of this quantitative study was to explore the potential relationship among the variables HIT, organizational effectiveness, organizational exchange of information, organizational process, organizational productivity, and direct personal care, based on a survey of health care providers.

Spearman's rho statistics was performed to test the hypotheses. Results showed that among healthcare providers, organizational effectiveness, organizational exchange of information, organizational process and organizational productivity had a statistically significant, correlation with health information technology. No evidence of a relationship existed between personal care and health information technology. Therefore, it was concluded that healthcare providers who adopt health information technology tend to perceive their organization to be more effective, to have better communication, to be more productive, to have strongly established processes, but the adoption of HIT did not have a positive correlation on healthcare providers regarding the issue of personal care.

Chapter 5 contains an interpretation of the study results. Chapter 5 also contains an explanation of the limitations of the study, recommendations for action, and suggestions for future research. Finally, chapter 5 includes implications for social change and a discussion on how the findings of the current study aligns or diverge from prior research studies in the literature review.

Chapter 5: Discussions, Conclusion, and Recommendations

Overview

The purpose of this quantitative study is to explore the potential relationship among the variables HIT, organizational effectiveness, organizational exchange of information, organizational process, organizational productivity, and direct personal care, based on a survey of health care providers. Typically when a new technology is adopted in a workplace, a positive or negative disruption occurs. Researchers are either focusing on institutions that are not representative of hospitals, which made the findings somewhat irrelevant to hospitals, or reporting general findings instead of clearly identifying the stakeholders affected by HIT adoption in the health care chain.

Chapter 4 included details of the statistical analysis and the results. Chapter 5 contains the overall results of the study, the limitations, implications for social change, recommendations for further study, and the conclusions. Chapter 5 also includes a discussion of the answers to the research questions and results of the hypothesis testing.

Data were collected using SurveyMonkey and a participant pool. Data were collected within 3 weeks. The results of the study showed that Organizational Effectiveness was significantly positively correlated with Organizational Process, Organizational Productivity, and Health Information Technology. Exchange of Information was significantly positively correlated with Organizational Process and Health Information Technology. Organizational Process was significantly positively correlated with Organizational Productivity and Health Information Technology.

However, no relationship existed between personal care and health information technology.

The results of the linear regression were significant, $F(4,111) = 78.50$, $p < .001$, $R^2 = 0.74$, suggesting that Organizational Effectiveness, Exchange of Information, Organizational Process, and Organizational Productivity accounted for 74% of the variance in Health Information Technology. The individual predictors were examined further. Organizational Effectiveness was a significant predictor of Health Information Technology, $B = 0.92$, $p < .001$, suggesting that for every one unit increase in Organizational Effectiveness, Health Information Technology increased by 0.92 units. Exchange of Information was not found to be a significant predictor of Health Information Technology. Organizational Process was a significant predictor of Health Information Technology, $B = 0.10$, $p = .021$, suggesting that for every one unit increase in Organizational Process, Health Information Technology increased by 0.10 units. Organizational Productivity was a significant predictor of Health Information Technology, $B = -0.13$, $p = .015$, suggesting that for every one unit increase in Organizational Productivity, Health Information Technology decreased by 0.13 units.

Interpretation of the Results

Participants of the study included healthcare providers ($n = 116$) from a North Florida hospital. I did not collect demographic statistics. To support rejecting the null hypothesis with a confidence level of 95%, the statistics used the standard $p < .05$.

Research Question 1

What is the relationship, if any, between the adoption of HIT and organizational effectiveness?

$H1_0$: There is no statistically significant relationship between the adoption of HIT and organizational effectiveness.

$H1_a$: There is a statistically significant relationship between the adoption of HIT and organizational effectiveness.

To address research question 1, null Hypothesis 1 was tested using Spearman's correlation. The result of the data analysis, $r = .80$, $p < .001$ indicated that a correlation existed and the organizational effectiveness positively related to HIT. Additionally, The results of the linear regression were significant, $F(1,114) = 270.71$, $p < .001$, suggesting that Organizational Effectiveness accounted for (R^2) 70.4% of the variance in Health Information Technology. Organizational Effectiveness was a significant predictor of Health Information Technology, $B = 0.93$, $p < .001$, suggesting that for every one unit increase in Organizational Effectiveness, Health Information Technology increased by 0.93 units. Because a p value of < .001 did not exceed significance level of .05, the null hypothesis was rejected. It was concluded that healthcare providers who perceive greater adoption of HIT tend to have a greater level of organizational effectiveness.

The results of the study were consistent with Blumenthal (2010) and Shields et al. (2010). Similarly, Fiscella and Geiger (2011), found that HIT technologies such as electronic medical record (EHR) has the potential to improve efficiency.

Research Question 2

What is the relationship, if any, between the adoption of HIT and exchange of information?

$H2_0$: There is no statistically significant relationship between the adoption of HIT and exchange of information.

$H2_a$: There is a statistically significant relationship between the adoption of HIT and exchange of information.

To address research question 2, null Hypothesis 2 was tested using Spearman's correlation. The result of the data analysis $r = .26$, $p = .005$ indicated that Exchange of Information was significantly positively correlated with Health Information Technology. Additionally, The results of the linear regression were significant, $F(1,114) = 5.64$, $p = .019$, suggesting that Exchange of Information accounted for (R^2) 4.7% of the variance in Health Information Technology. Exchange of Information was a significant predictor of Health Information Technology, $B = 0.18$, $p = .019$, suggesting that for every one unit increase in Exchange of Information, Health Information Technology increased by 0.18 units. Because a p value of .005 did not exceed the significance level of .05, the null hypothesis was rejected. It was concluded that there is a strong evidence to suggest that healthcare providers who perceive themselves to have a strong HIT adoption tend to have a better organizational communication.

The results of the study were consistent with Kimaro and Nhampossa (2010), McCarthy and Eastman (2010), and Glaser (2011) which indicated that useful and reliable organizational information was reliant on effective assimilation of information

technology. Similarly the results of the study aligned with Healthypeople2020 (2012) study that indicated that effective use of HIT tools and health communication processes improves physician and management decisions. The result of the study contrasted with Lehmann et al.'s (2015) who that showed a smaller percentage of providers describe their electronic health records as having a positive impact on provider communication, while Bloom et al. noted an increase in organizational control but decrease in autonomy.

Research Question 3

What is the relationship, if any, between the adoption of HIT and organizational process?

$H3_0$: There is no statistically significant relationship between the adoption of HIT and organizational process.

$H3_a$: There is a statistically significant relationship between the adoption of HIT and organizational process.

To address research question 3, null Hypothesis 3 was tested using Spearman's correlation. The result of the data analysis $r = .32$, $p < .001$ indicated that a correlation existed and the organizational process positively related to HIT. Additionally, the results of the linear regression were significant, $F(1,114) = 17.25$, $p < .001$, suggesting that Organizational Process accounted for (R^2) 13.1% of the variance in Health Information Technology. Organizational Process was a significant predictor of Health Information Technology, $B = 0.30$, $p < .001$, suggesting that for every one unit increase in Organizational Process, Health Information Technology increased by 0.30 units. Because a p value of $< .001$ is less than the significance level of .05, sufficient evidence existed to

conclude that the null hypothesis should be rejected. It was concluded that there is a strong evidence to suggest that healthcare providers who adopt HIT tend to have a better organizational process.

The results of the study were consistent with McCarthy and Eastman (2010). Maintaining viability of health information technology so that use of the technology is continued over time was dependent upon successful processes.

Research Question 4

What is the relationship, if any, between the adoption of HIT and organizational productivity?

$H4_0$: There is no statistically significant relationship between the adoption of HIT and organizational productivity.

$H4_a$: There is a statistically significant relationship between the adoption of HIT and organizational productivity.

To address research question 4, null Hypothesis 4 was tested using Spearman's correlation. The result of the data analysis $r = .23$, $p < .004$ indicated that a correlation existed and the organizational productivity positively related to HIT. Additionally, to examine the research question, a linear regression was conducted to assess if Organizational Productivity scores predict Health Information Technology. The results of the linear regression were not significant, $F(1,114) = 2.16$, $p = .144$, suggesting that Organizational Productivity scores did not predict Health Information Technology. Because a p value of .004 is less than the significance level of .05, therefore the null

hypothesis was rejected. It was concluded that healthcare providers who adopt HIT tend to have a higher organizational productivity.

The results of the study contrasted with Brynjoffson (2013), Brynjolfsson and Hitt (2010) and Lehmann et al. (2015). The results from the previous studies done on productivity and return on investment have suggested that investing in IT does not necessarily guarantee commensurate gains in productivity.

Research Question 5

What is the relationship, if any, between the adoption of HIT and patients' direct personal care?

$H5_0$: The There is no statistically significant relationship between the adoption of HIT and patients' direct personal care.

$H5_a$: There is a statistically significant relationship between the adoption of HIT and patients' direct personal care.

To address research question 5, null Hypothesis 5 was tested using Spearman's correlation. The result of the data analysis $r = .10$, $p = .290$ indicated there was not a statistically significant correlation between personal care and HIT. Additionally, to examine the research question, a linear regression was conducted to assess if Personal Care scores predict Health Information Technology. The results of the linear regression were not significant, $F(1,114) = 2.69$, $p = .104$, suggesting that Personal Care scores did not predict Health Information Technology. Because the p value of .290 exceeded the significance level of .05, therefore there was insufficient evidence to reject the null hypothesis. It was concluded that among healthcare providers, there is no statistically

significant correlation between perceived personal care and HIT adoption. Healthcare information technology makes care delivery impersonal because it makes patients less involved. When experts use HIT applications especially telemedicine personal care becomes secondary.

The results of the study were consistent with McCarthy and Eastman (2010), Shields et al. (2010), and Bailey (2011). Similarly the results of the study aligned with Martin and Ormari (2015) and Lehmann et al. (2015). The results of the previous works indicated that the use and non-use or low adoption of technology by providers is a social factor, not technical. Therefore the benefit of HIT depends on the end users. HIT is not related to employees' behavior (Martin and Omari, 2015), and has less positive impact on clinical decisions (Lehmann et al. (2015).

Limitations of Study

The first limitation of the study was the methodological approach used. Even though a relationship between the independent and dependent variables was determined, cause and effect relationship among the variables was not investigated. To obtain context-rich information on the impact of healthcare information technology on organizational effective, productivity, process, or communication, a mixed-method or qualitative method would be more appropriate. A second limitation involved the use of a single site for the participant pool. A broader participant pool involving other healthcare providers based on size or even profit and not for profit status would have produced a different result. Another limitation involved the questionable alpha score of .68 for personal care. The alpha value is consistent with the variations of the respondents and

demographic characteristics. Finally, this study contains data that represents only one healthcare organization in the United States. Therefore, the results are not generalizable to healthcare providers worldwide.

Implications for Social Change

The information from this study affects social change by providing hospital leaders with critical information needed to make more knowledgeable decisions in their workplaces. The study has practical implications for policy-makers and stakeholders who are interested in supporting the adoption of health information technologies by healthcare providers to enhance productivity in the healthcare sector. The findings of the study show that Organizational Effectiveness was significantly positively correlated with Organizational Process, Organizational Productivity, and Health Information Technology. Exchange of Information was significantly positively correlated with Organizational Process and Health Information Technology. Organizational Process was significantly positively correlated with Organizational Productivity and Health Information Technology.

The information in the current study contributes to the field of management by providing to hospital and healthcare providers' management the daily perceptions of healthcare providers about healthcare IT use. The results of this study may help leaders of healthcare organizations understand the perspectives of their employers, and therefore, enable them to shape policies and procedures that guide healthcare IT adoption and improved workflow.

Recommendations for Action

The findings did not show any statistically significant relationship between HIT adoption and personal care. Therefore healthcare organizations may want to implement a patient-centered awareness program that includes healthcare workers. Healthcare providers may collaborate with other providers and patients to develop an efficient and effective way to communicate with patients, to gain a better understanding of their situation in order to achieve a patient-centric organization.

Recommendations for Further Study

This study is first step towards understanding where to focus and what variables to consider in a future causal analysis. A study on the cause and effect of the variables may shed more light on the impact of HIT on healthcare organizational effectiveness. Future studies may want to replicate this study and explore the relationships among the demographics. For instance, researchers may want to explore what the findings will be across different demographic variables. As previously discussed, more study needs to be conducted on the relationship between HIT and patient centered care. This study provided a base, however more research is necessary on this subject and possibly with a different instrument.

Summary and Conclusion

This study added to the body of knowledge in the IT field and provided information that providers may find useful by examining the relationship among technology, structure, process, and outcome. The research problem led to the investigation of how healthcare providers perceive how information technology relates to

their effectiveness, personal care, processes, and productivity. The purpose of this quantitative study was to explore the potential relationship among the variables HIT, organizational effectiveness, organizational exchange of information, organizational process, organizational productivity, and direct personal care, based on the perceptions of health care providers. The research questions were proposed to answer whether a correlation exists among HIT, organizational effectiveness, organizational exchange of information, organizational process, organizational productivity, and direct personal care. Among healthcare providers, a statistically significant positive correlation existed between organizational effectiveness, organizational exchange of information, organizational process, and organizational productivity and healthcare information technology. No statistically significant correlation existed between personal care and health information technology. Healthcare information technology makes care delivery impersonal because it makes patients less involved. When experts use HIT applications especially telemedicine personal care becomes secondary.

According to Fisher and Feignbaum (2015), the strategic goal of all healthcare organizations is to provide safe, quality data-driven care to their patients. Organizations successful in operationalizing health information technologies such as electronic health records have demonstrated the potential to decrease health disparities among populations they serve (Shields et al., 2010) and improve the efficiency, quality, and safety of health care (Fiscella & Gieger, 2011). Maintaining viability of health information technology so that use of the technology is continued over time was dependent upon successfully

addressing the three critical components of technology, processes, and people (McCarthy & Eastman, 2010).

Effective assimilation of health information technology into the information systems of an organization was reliant upon the technology continuing to provide useful and reliable information to meet the changing needs of the organization (Kimaro & Nhampossa, 2010; McCarthy & Eastman, 2010). Second, implementing health information technology was an ongoing process that continued as the technology became embedded in the operations and processes of organizational staff (McCarthy & Eastman, 2010). In addition, ongoing use of health information technology was supported by staff that was capable and willing to maintain technology use without significant interruptions independent of software or hardware changes (Kimaro & Nhampossa, 2010; McCarthy & Eastman, 2010). This quantitative correlational study provided evidence of the relationship among health information technology, organizational effectiveness, process, productivity and personal care as a foundation for further studies on cause and effect.

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Appendix A: Permission to use Patient Practitioner Orientation Scale

From: <Krupat>, Ed krupat <ed_krupat@hms.harvard.edu>
Date: Tuesday, November 12, 2013 10:20 AM
To: Christian Ukaga <cukaga@waldenu.edu>
Subject: Re: Permission to use Patient Practitioner Orientation Scale

Christian,

I would be glad to have you use the PPOS in your project. There is no fee nor any more formal permission that is required. I am attaching a document with the scale, scoring instructions, and a fairly up-to-date bibliography of papers and presentations featuring the scale. The 9-item scale you refer to is most likely simply the Sharing sub-scale. It has better psychometric properties than the Caring sub-scale, and more often, although not always, it predicts to other outcomes better. I would ask in return to hear of your findings once you have completed the project and analyzed the data.

Best of luck in your work,

Ed Krupat

Edward Krupat, PhD

Director

Center for Evaluation

Harvard Medical School

384 MEC

260 Longwood Ave.

Boston, MA 02115

617-432-1689 (phone) 617-734-5224 (fax)

Appendix B: Permission to Use Organizational Process Survey

phylton@iupui.edu;

Christian Ukaga<cukaga@waldenu.edu>;

RE: Permission to Use Organizational Process Survey

You are welcome to use my instrument in your PhD research with my best wishes for the completion of your doctorate with proper credit given.

I have done no further research with the instrument since it was published in my dissertation. I am taking a breather for a while since I only completed my doctorate in July.

Pete

Dr. Pete Hylton, Ed.D.

Associate Professor & Director of Motorsports Engineering

Indiana University Purdue University Indianapolis

799 W. Michigan St. - ET201T

Indianapolis, IN 46202

317-274-7192

phylton@iupui.edu

Appendix C**:** Permission to Use Productivity Scale

Subject RE: Permission to Use Productivity Scale Instrument in my research

Date : Fri, Oct 18, 2013 12:53 AM CDT

From : **"McNeese-Smith, Donna" <dmcneese@sonnet.ucla.edu>**

To : Christian Ukaga <cukaga@waldenu.edu>

Attachment :

You are certainly welcome to use it. I am not sure it will be appropriate for what you want but you may use the same format and add more questions, or change them to better measure the changes that health information technology has on organizational productivity. Attached is a document I created many years ago for students to use.

Best wishes to you.

Dr. McNeese-Smith

Appendix D: Organizational Effectiveness Scale

Organizational Effectiveness Scale Note: Test name created by PsycTESTS PsycTESTS Citation: Rotondi, T., Jr. (1975). Organizational Effectiveness Scale [Database record]. Retrieved from PsycTESTS. doi: 10.1037/t20482-000 Test Shown: Full Test Format: Item responses range from 1 to 5 on a 5-point Likert scale. Source: Rotondi, Thomas. (1975). Organizational identification: Issues and implications. Organizational Behavior & Human Performance, Vol 13(1), 95-109. doi: 10.1016/0030-5073(75)90007-0, © 1975 by Elsevier. Reproduced by Permission of Elsevier. **Permissions: Test content may be reproduced and used for non-commercial research and educational purposes without seeking written permission.** Distribution must be controlled, meaning only to the participants engaged in the research or enrolled in the educational activity. Any other type of reproduction or distribution of test content is not authorized without written permission from the author and publisher.

PsycTESTS™ is a database of the American Psychological Association doi: 10.1037/t20482-000

Appendix E: Communication Questionnaire

Communication Questionnaire Note: Test name created by PsycTESTS PsycTESTS Citation: Roberts, K. H., & O'Reilly, C. A., III. (1974). Communication Questionnaire [Database record]. Retrieved from PsycTESTS. doi: 10.1037/t13756-000 Test Shown: Partial Test Format: Items are scored on 7-point scales, except for indexes 5, 6, and 7 which use 10-point scales. Source: Roberts, Karlene H., & O'Reilly, Charles A. (1974). Measuring organizational communication. Journal of Applied Psychology, Vol 59(3), 321-326. doi: 10.1037/h0036660**. Permissions: Test content may be reproduced and used for non-commercial research and educational purposes without seeking written permission.** Distribution must be controlled, meaning only to the participants engaged in the research or enrolled in the educational activity. Any other type of reproduction or distribution of test content is not authorized without written permission from the author and publisher.

Appendix F: Survey Instrument

Consent Form

"The Relationship between Information Technology and Organizational Effectiveness as Perceived by Health Care Providers"

Dear Respondent,
You are invited to take part in a research study titled the relationship between health information technology and organizational effectiveness.

You were selected as a possible participant because you are a health care professional that use health information technology for at least one year. Your feedback based on your perception of health care IT (HIT), personal care and effectiveness in your organization will be very instrumental in helping to create better understanding of how HIT relates to effectiveness, personal care, productivity, communication, and processes not only within health care environments, but within similar organizations as well.
Please read this consent form and ask any questions you might have before acting on this invitation to be in the study. This research is being conducted by Christian Ukaga who is a doctoral student at Walden University.

Background Information:
The purpose of the study is to explore the potential relationship among health care IT, organizational effectiveness, organization exchange of information, organizational process, organizational productivity, and direct personal care, as perceived by health care providers.

Procedures:
If you agree to be in this study, you will be asked to:
- take a brief electronic survey
- the survey is anonymous
- will take approximately 15 minutes to complete
- data will be collected only once.

Voluntary Nature of the Study:
Your participation in this study is voluntary. This means that everyone will respect your decision of whether or not you want to be in the study. If you decide to join the study now, you can still change your mind later. In the event you experience stress or anxiety during your participation in the study you may terminate your participation at any time. You may refuse to answer any questions that you consider invasive or stressful.

Risks and Benefits of Being in the Study:
Since the study will be conducted anonymously, there are no physical risks to you, nor is it likely that you will suffer any adverse psychological effects, but should you need supportive services or feel distress while participating in this study, please call your local emergency assistance program. In Tallahassee please call TMH or CRMC Emergency Assistance Program at 850-431-5190 or 850-325-5000. Individual participants may benefit from this study to the extent that the findings provide information that is used to assist health care providers and leaders to have a better understanding of the relationship between HIT and organizational effectiveness from the perspectives of healthcare professionals who adopt and use health information technologies.

Compensation:
No compensation will be provided for your participation.

Confidentiality:
Any information you provide will be anonymous. No one, not even the researcher, will know who participated. Research records will be kept in a password protected database, only the researcher will
have access to the records. All files will be destroyed after five years from the completion of the study.
Contact and Questions:
The researcher conducting this study is Christian Ukaga. The researcher's dissertation
chairperson is Dr. Walter McCollum. If you have questions, you can contact the researcher directly at cukaga@waldenu.edu or (cell) 850-339-5235. If you want to talk privately about your rights as a participant, you can contact a Walden University representative who can discuss this with you.

The phone number is 1-612-312-1210. Walden University's approved number for this study is 07-31-14-0014377 and it

expires on July 30, 2015.

***1. I consent to take part in the study**

- ◯ Do not consent
- ◯ Consent

Organizational Effectiveness

Please use the following response option for each part of the next questions to indicate how effective you feel your organization has been in achieving outcomes it intends to produce with HIT adoption:

2. Efficiency of co-workers in carrying out task assignments

- ◯ 1 (Not at all)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (Extremely)

3. Adaptability of co-workers to changes in task requirements

- ◯ 1 (Not at all)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (Extremely)

4. Involvement of co-workers in interpersonal conflicts impeding task progress

- ◯ 1 (Not at all)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (Extremely)

5. Job satisfaction expressed by co-workers

- ◯ 1 (Not at all)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (Extremely)

6. Success of co-workers in achieving task goals

- ◯ 1 (Not at all)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (Extremely)

Organizational Communication

This is a series of questions about how people communicate at work. Imagine a typical week at work, and answer the questions accordingly. Please attempt to answer all of the questions.

7. Of the total time you engage in communications, what percentage of the time do you use the following methods to communication: (Please enter whole numbers to represent percentages, i.e., 50 to represent 50%)

Written	
Face-to-Face	
Telephone	
Other	

8. When receiving information from the sources listed below, how accurate would you estimate it usually is?

	1 (Completely accurate)	2	3	4	5	6	7 (Completely inaccurate)
Immediate supervisors	◯	◯	◯	◯	◯	◯	◯
Subordinate	◯	◯	◯	◯	◯	◯	◯
Peers (others at your job level)	◯	◯	◯	◯	◯	◯	◯

9. How often do you find the amount of available information hinders rather than helps your performance in this organization?

◯ 1 (Almost never have too much information)
◯ 2
◯ 3
◯ 4
◯ 5
◯ 6
◯ 7 (Have too much information)

10. Do you feel that you receive more information than you can efficiently use in this organization?

- ◯ 1 (Always)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7 (Never)

11. How desirable do you feel it is in your department to interact frequently with:

	1 (Very desirable)	2	3	4	5	6	7 (Completely undesirable)
Immediate supervisors	◯	◯	◯	◯	◯	◯	◯
Subordinate	◯	◯	◯	◯	◯	◯	◯
Peers (others at your own level)	◯	◯	◯	◯	◯	◯	◯

Organizational Process

Please read each item carefully. Then, using the scale below the item, mark your response based on your personal experience.

12. To what extent does your organization have a set of organizational processes, that is, a documented series of logically related tasks or steps which describe the division of labor, the specialization of skills, the individual steps, and the decision points, which guide your organizational operations through a structured set of activities designed to achieve a desired result?

- ◯ 1 (Weakly established processes)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7 (Strong established processes)

13. To what extent do you believe that closely adhering to a set of fixed organizational processes would benefit or not benefit your organization in its efforts to meet its goals and objectives?

- ◯ 1 (Not benefit)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7 (Benefit)

14. To what extent does your organization's leadership ensure that set organizational processes are adhered to?

- ◯ 1 (Low commitment)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7 (High commitment)

15. To what extent does the leadership of your organization demonstrate a philosophy of commitment to continuous improvement of fixed processes and to following the fixed processes which are in place?

- ◯ 1 (No commitment)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7 (Strong commitment)

16. To what extent does following fixed organizational processes benefit or not benefit your organization's efforts to obtain customer satisfaction?

- ◯ 1 (Does not benefit)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7 (Benefits)

Organizational Productivity

As a hospital employee you have many responsibilities. Follow are just a few that may or may not have been important. Please select the number indicating the contribution you feel health care IT adoption have been able to make your department in each area in the past year:

17. Select the level of contribution

	Slight contribution	Some	Medium	High	Very high contribution
Helping to meet overall hospital goals	○	○	○	○	○
Providing a high quality of service in my department	○	○	○	○	○
Assisting my department to meet its productivity goal	○	○	○	○	○
Helping to accomplish a large amount of work in my department	○	○	○	○	○
Helping my department to be accurate/free of errors	○	○	○	○	○

Personal Care

The statements below refer to beliefs that you might have concerning patients and medical care. Read each item and then indicate how much you agree or disagree with each:

18. Select level of agreement:

	Strongly disagree	Moderately disagree	Slightly disagree	Slightly agree	Moderately agree	Strongly agree
Although healthcare is less personal these days, this is a small price to pay for medical advances	○	○	○	○	○	○
Patients should rely on their doctors' knowledge and not try to find about their condition on their own	○	○	○	○	○	○
The doctor is the one who should decide what gets talked about during a visit	○	○	○	○	○	○
Patients should be treated as if they were partners with the doctor, equal in power and status	○	○	○	○	○	○
When patients look up medical information on their own, this usually confuses more than it helps	○	○	○	○	○	○

Finished

Thank you taking the time to participate in the study.

Appendix G: Consent Form

Consent Form

"The Relationship between Information Technology and Organizational Effectiveness as Perceived by Health Care Providers"

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have access to the records. All files will be destroyed after five years from the completion of the study.
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