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Nurses Knowledge, Skills, and Attitude Toward Electronic Health Records (EHR)

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Walden University

College of Health Sciences

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Sharon Adams

has been found to be complete and satisfactory in all respects,
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Walden University

2015

Abstract

Nurses Knowledge, Skills, and Attitude Toward Electronic Health Records (EHR)

by

Sharon L. Adams

Project Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Nursing Practice

Walden University

May 2015

Abstract

Information technology (IT) has been rapidly integrated into the healthcare industry, including nursing, and has the ability to reduce errors, cut cost, and enhance patient care. However, approximately 45% of the current nurse workforce lacks adequate training in computer skills, which may hinder the adoption of health-related IT in the workplace. Characteristics of Rogers's diffusion of innovation (relative advantage, compatibility, complexity, trialability, and observability) guided this project. This project was conducted to address the problem of IT adoption on a local level and was designed to assess whether simulation training on a generic electronic health record (EHR) system would improve the knowledge, skill, and attitude of nurses with little or no experience with EHR. A convenience sample of nurses ($n = 13$) unfamiliar with EHR was obtained by posting flyers in long-term care or home health agencies. The nurses completed the P.A.T.C.H. assessment scale v. 3 (2011) before and after participating in the one-time simulation training on EHR. Scores on the P.A.T.C.H. were calculated according to the established scoring system and revealed a positive increase nurses' attitude and self-efficacy toward the EHR system. Posttest scores yielded an increase ranging from 0.5 to 5 points from pretest scores, with an average pretest score of 54.23 on a scale of 0-100. The results of this project are consistent with the literature and current research and illustrate the importance of addressing the need for interactive training. This project contributes to social change in practice by enhancing the awareness of EHR in nurses who are new users of IT and promoting the adoption of technology in healthcare.

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Dedication

This project is dedicated to my family. First, to my husband, Jim-you have been my inspiration and greatest source of support and patience. You have earned this degree with me. To my daughter, Lora-you are an amazing woman and mother. You have given me two of my four greatest joys in life. You have more strength and courage than you know. To my son, Brad-you are a strong man both physically and mentally. I am excited to see your future. Thank you for your service to this country. To my friend, Susan-you are a rare find, a true friend. Thank you.

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Section 1: Overview of the Evidence-Based Project

Introduction

The American Recovery and Reinvestment Act (ARRA, 2009) and the attached Health Information Technology for Economic and Clinical Health (HITECH) Act place the healthcare system as a national priority (Burke, Stewart, & Cartwright-Smith, 2010). The HITECH Act provides a legal and financial framework for implementing health information technology (HIT) and promoting meaningful use (Burke et al., 2010). Meaningful use involves “using electronic health records (EHR) technology to improve quality, safety, efficiency and reduce health disparities; engage patients and family; improve care and coordination, and population and public health; and maintain privacy and security of patient health information” (Murphy, 2010, p. 284). The U.S. government allocated an estimated \$19 billion for hospitals and ambulatory settings to implement meaningful use with EHR (Murphy, 2010).

Adopting the EHR has implications for the social change landscape within the healthcare industry. Implementation of an EHR is currently a priority for the U.S. healthcare system (Song et al., 2011). Electronic health records have the capability to address population and public health information needs and contribute to government health policies and financing (Friedman, Parrish, & Ross, 2013). Information accumulated in the EHR can be used to promote healthy lifestyles and environments, reveal the prevalence of diseases, and provide data to change policies (i.e., banning sale of cigarettes to minors; Friedman et al., 2013). An EHR can be routinely used to improve communication, quality of care, reduce medical errors, and eliminate waste (Song et al.,

2011).

Despite the advantages of the EHR, nurses have been reluctant to embrace the technology. A recent survey conducted by *Positioning Nursing in a Digital World* (2014) found that a third of nurses have not received training on an information technology system (as cited in Wright, 2014, p. 64). This lack of training affects attitudes and fosters resistance to adopting an EHR (Wright, 2014). To avoid resistance and failure to adopt, it has been suggested that simulated training on an EHR system can assist nurses in feeling less overwhelmed and more confident with technology (Haugen, 2012). This project was conducted to address the use of simulated training to foster acceptance of the EHR and was guided by the framework of Rogers's diffusion of innovation (DOI). This project was necessary as it related to the realization among nurses that possessing computer skills is critical to their practice due to the rapid expansion of technology throughout society (Peace, 2011). In order to practice effectively, nurses must possess basic computer skills and have basic information literacy (Peace, 2011). Training nurses on an EHR system in a simulated environment promotes their confidence in skills they need to grow and addresses the fear of mistakes and failure associated with the use of technology (Wright, 2014). These skills are now a necessity for the practice of nursing and allow nurses to be part of the social change occurring in healthcare.

The implementation of the EHR is viewed as a method to increase the safety, efficiency, and effectiveness of healthcare while improving the quality of patient care (Culley, Polyakova-Norwood, & Effken, 2012). Dr. David Blumenthal, current National Coordinator of HIT, stated,

HIT is the means, but not the end. Getting an EHR up and running in health care is not the main objective behind the incentives provided by the federal government under ARRA: improving health is. Promoting health care reform is” (as cited in Murphy, 2010, p. 285).

The Doctorate of Nursing Practice (DNP) nurse must be prepared to take a leadership role in disseminating best practices by facilitating communication and supporting discussion among healthcare providers regarding meaningful use.

Background and Context

The idea of improving patient care is not new and the goal of representing information in a managed form has been pursued for centuries. In the 17th century, Wilhelm Von Leibnitz searched for a method to code human behavior in order to represent the information in a managed form (Cesnik, 2010). Florence Nightingale (1863) in her book *Notes on Hospitals* recognized the need to group information to reveal a disease pattern or cause:

I am fain to sum up with an urgent appeal for adopting this or some uniform system of publishing the statistical records of hospitals. There is a growing conviction that in all hospitals, even those which are best conducted, there is a vast and unnecessary waste of life ... In attempting to arrive at the truth, I have applied everywhere for information, but in scarcely an instance have I been able to obtain hospital records fit for any purpose of comparison. If they could be obtained, they would enable us to decide many other questions besides the one alluded to ... if wisely used, these improved statistics would tell us more of the

relative value of particular operations and modes of treatment than we have any means of ascertaining at present ... the truth thus ascertained would enable us to save life and suffering, and to improve the treatment and management of the sick and maimed poor. (pp. 175-176)

Even with this astute observation by Florence Nightingale, it would be another century before progress was made in assembling data in one area. World War II was the catalyst for the development of electronic computers. The computer was large and bulky, occupying an entire room, and ran on valves that utilized great amounts of power (Cesnik, 2010). However, it was a beginning, and from that point, computers rapidly evolved to become a powerful tools in assisting the business world including hospital systems, health related areas, and providers (Cesnik, 2010).

In the 1970s, professional and scholarly journals began to publish reports of computer applications in nursing (Ozbolt & Saba, 2008). Systems were developed for nursing care planning to assist in improving the completeness and quality of charting. These were the early precursors of current protocols and pathways that are now built on evidence-based practice (Ozbolt & Saba, 2008). The 1980s and 1990s saw progress in the increasing number of healthcare professionals who recognized the benefits and necessity of standardizing data to support nursing practice and to create new knowledge (Ozbolt & Saba, 2008). Standardized terminology in nursing was needed to facilitate the ability of data to be interoperable between computer systems. It was not until 2000 that the Nursing Terminology Summit approved a reference terminology model for nursing (Ozbolt & Saba, 2008).

A startling report issued by the Institute of Medicine (IOM), *Crossing the Quality Chasm: A New Health System for the 21st Century* (2001) propelled public and private efforts to fully merge healthcare with technology (Ozbolt & Saba, 2008). In 2004, President George W. Bush signed into law Executive Order 13335, which urges every American to have an accessible health record by 2014 (Ozbolt & Saba, 2008; Wimberley, 2010). In 2009, President Barack Obama authorized the \$800 billion stimulus package ARRA (Wimberley, 2010). Along with HITECH, ARRA aims to enhance the standard of health care and create a national electronic health record exchange (Wimberley, 2010).

However, despite the mandate, a 2008 study revealed that in a survey of U.S. physicians, only 4% had enacted an EHR and 7.6% of hospitals had implemented only simple systems (Wimberley, 2010). There are an estimated 2.5 million registered nurses (RNs) employed in the United States, and a 2008 study revealed that only 17% use a complete EHR on a consistent basis (Huryk, 2010). This is expected to change rapidly in the next few years. In 2011, Medicare and Medicaid launched the EHR incentive program. This incentive will be available through 2016 and is intended to offset the initial start-up cost of an EHR. Providers (i.e., hospitals and ambulatory clinics) must show meaningful use by 2015 (McBride, Delaney, & Tietze, 2012). This will happen in stages with Stage 1 consisting of data capture and sharing, including computerized providers order entry (CPOE; McBride et al., 2012).

One specific problem is related to the nurses' inability to use computers and/or lack of training on EHR. Nurses have expressed fear of losing their jobs, losing data, spending less time spent with patients, and lacking knowledge (Huryk, 2010). These fears

combined with a negative attitude affect the successful adoption of an EHR (Huryk, 2010; Kaya, 2011). There is significant need to address these fears due to current and future implementation of an EHR that will be nationwide (Huryk, 2010). Nurses have more contact with the patient than those in other disciplines, and the data that the nurses gather are crucial to meaningful use (McBride et al., 2012). The addition of EHR forces the nurses to change their workflow; therefore, it is crucial that training be provided. In offering training on a simulated EHR system, the framework of DOI was applied and the nurses were shown the benefits of the EHR. This required interdisciplinary cooperation and merging of resources in order to achieve integration of information for interoperable communication. This is consistent with Florence Nightingale's (1863) vision of "hospital records fit for any purpose of comparison" (p. 175).

Problem Statement

An identified problem with the adoption of EHR was a lack of basic computer skills in nurses who have no background in information technology. Up to 45% of current nurses were in the workforce before the proliferation of technology (Furst et al., 2013). Therefore, a lack of training and/or preparation with computer skills hinder the adoption of technology and lead to cognitive and attitudinal barriers (Courtney, Demiris, & Alexander, 2005; Furst et al., 2013). This can have a significant impact on workflow. Nurses are responsible for integrating multiple sources of information along with coordination of resources in their daily management of patient care (Courtney et al., 2005; Furst et al., 2013). The addition of HIT to the existing workload without adequate

training affects productivity and the adoption of the technology (Courtney et al., 2005; Furst et al., 2013).

Health information technology has the capability to decrease errors, waste and cost in healthcare (Bredfeldt, Awad, Joseph, & Snyder, 2013; Courtney et al., 2005; Nkosi, Asah, & Pillay, 2011). Health information technology's contribution to addressing the growing crisis in healthcare includes reducing the number of medication errors, promoting efficiency in time management, monitoring adherence to treatment plan, reducing inpatient days, and tracking trends (Zhang et al., 2013).

However, to reach this potential, healthcare providers must be willing and able to use the technology (Bredfeldt et al., 2013; Courtney et al., 2005; de Veer & Francke, 2010; Lu, Hsiao, & Chen, 2012; Nkosi et al., 2011). Moving from a paper-based milieu to HIT is often a disruptive process that requires training on multiple levels (Rothman, Leonard, & Vigoda, 2012). Many current healthcare professionals received their educational training before the information technology explosion and lack basic computer skills to successfully navigate an EHR (Bredfeldt et al., 2013; Furst et al., 2013). Due to the lack of computer skills, multiple training sessions are necessary to overcome the new users' initial feeling of being overwhelmed (Bredfeldt et al., 2013; Courtney et al., 2005; de Veer & Francke, 2010; Lu et al., 2012; Nkosi et al., 2011). These training sessions should be spaced prior to an implementation to reinforce the new users' beginning skills. This can continue to reduce anxiety related to the use of HIT and allow the time needed to become acquainted with the technology (Carayon et al., 2011; Courtney et al., 2005; Culley et al., 2012; de Veer & Francke, 2010; Nkosi et al., 2011).

Literature reveals that adoption barriers to information technology (IT) center on situational, cognitive, or physical, legal and/or attitudinal barriers (Courtney et al., 2005). The degree to which the technology is perceived to be of benefit is recognized as relative advantage, which is the first characteristic of innovation in the DOI process (Rogers, 2003). The acceptance of new technology can depend on the interaction and social dynamics of coworkers and the culture of the organization (Courtney et al., 2005; De Veer & Francke, 2010; Lu et al., 2012). The relevance of the influence of peers and the organization toward the adoption of IT cannot be overlooked or underestimated. Nurses more readily accept new technology if it is perceived to be a fit with nursing practice, improves patient outcomes, and decreases the workload of the nurse (Courtney et al., 2005; De Veer & Francke, 2010; Lu et al., 2012). Nurses are the largest discipline in healthcare and present with unique information needs. The acceptance of HIT is dependent on training, workplace culture, and the perceived benefit of the technology (Courtney et al., 2005). Therefore, it is crucial to obtain a nursing perspective when implementing an IT system in order to promote the acceptance and integration of the system (Carayon et al., 2011; Courtney et al., 2005; De Veer & Francke, 2010; Lu et al., 2012; Nkosi et al., 2011).

Purpose Statement and Project Objectives

The purpose of this project was to evaluate the effectiveness of simulated training with a generic EHR to improve the knowledge, skill, and attitude of nurses with little or no training on an EHR. This project was conducted to measure (a) nurses' knowledge,

skill, and attitude toward EHR; (b) nurses' level of comfort in using the EHR; and (c) nurses' level of satisfaction with training on EHR (Culley et al., 2012; Nkosi et al., 2011).

To address the problem of HIT adoption, this project was implemented to reduce the impact of lack of training on EHR through the use of simulation. Research found that nurses with previous exposure and basic training on computers were more confident and less resistant to adopting HIT (Goldsack & Robinson, 2014; Gregory & Buckner, 2014; Nkosi et al., 2011). Simulated activities on a generic EHR offered the opportunity to practice learning computer and charting skills in a safe, nonthreatening environment that allowed the learners to feel more secure in their ability to succeed (Guise, Chambers, & Välimäki, 2011; Haugen, 2012). These activities were guided by the framework of DOI and started with presenting the relative advantage and compatibility of the EHR. Rogers (2003) found that relative advantage to be a crucial component and the first step necessary in the adoption of an innovation. Once the nurse recognizes the advantage, compatibility to the workflow can more readily be developed (Rogers, 2003).

This project was implemented to address the gap in practice that existed locally. Although the major healthcare providers in the author's local community (i.e., hospitals) had converted to an EHR, other healthcare providers (i.e. long-term facilities and home health care agencies) remained on paper-based systems. These community clinically-based employers were in various planning stages to implement an EHR and training for healthcare professionals was necessary. As many of the nurses and staff had not charted on an EHR, simulated training was anticipated to be beneficial (Cato & Abbott, 2006; Culley et al., 2012). Providing hands-on training on an EHR in a safe environment

alleviated anxiety, promoted a positive attitude toward the potential use of the EHR, and increased self-efficacy (Cato & Abbott, 2006; Courtney et al., 2005; de Veer & Francke, 2010; Lu et al., 2012). The DNP nurse is in a position to lead in implementing the Quality and Safety Education for Nurses (QSEN) guidelines for informatics to, “use information and technology to communicate, manage knowledge, mitigate error and support decision making” (QSEN Institute, 2014).

Significance and/or Relevance to Practice

Healthy People 2020 set as one of its goals to advance the use of HIT in order to enhance overall population health outcomes (U.S. Department of Health and Human Services [DHHS], 2014). Healthy People 2020 has 13 primary objectives for HIT with each one having several subobjectives. Objective HC/HIT 5.1 is “Increase the proportion of persons who use the Internet to keep track of personal health information, such as care received, test results, or upcoming medical appointments” (DHHS, 2014). The percentage reported in 2007 was 14.3%; the goal for 2020 is 15.7%; and the current status is 19.2% (DHHS, 2014). Objective HC/HIT-10 is “Increase the proportion of medical practices that use electronic health records” (DHHS, 2014). In 2007, the reported percentage was 25%; the target for 2020 was 27.5%; and the current status is 60.9% (DHHS, 2014).

Every area related to health communication and health information technology is reporting an increase or is surpassing the set goal. This is relevant to nursing’s approach toward the community and its efforts in disseminating information. The ability of the nurse to integrate HIT into practice is a crucial component of social change in healthcare

(Huryk, 2010). Every day, people in all communities across the nation use the Internet to be informed of current events and this can influence the interaction with health care (DHHS, 2014). This is in line with QSEN's competencies goals for nurses. The necessity and importance of informatics was highlighted when the QSEN noted that the development of the remaining five competencies was reliant on basic informatics skills (Cronenwett et al., 2007).

Many of today's nurses are not digital natives and did not grow up using information technology (Bredfeldt et al., 2013). Information technology training is necessary and needs to be presented in an atmosphere that allows the user not to become overwhelmed with the new format and information (Culley et al., 2012; de Veer & Francke, 2010; Nkosi et al., 2011; Whittaker, Aufdenkamp, & Tinley, 2009). Learners can consist of multiple generations with different learning styles and levels of comfort with technology. Implementation of this project demonstrated relevance to practice by providing a safe environment in which the nurses learned a generic charting system and experimented with IT and had the ability to role play on simulated charting with varying degrees of complexity (Carayon et al., 2011; Culley et al., 2012). This project addressed different learning styles, accommodated different levels of comfort with technology and promoted the importance of IT in the future practice of the participating nurses (Culley et al., 2012; Whittaker et al., 2009).

The Department of Health (DH, 2011) recommends simulation training when it is used to enhance and benefit patient care (as cited in Handley & Dodge, 2013, p. 529). There is a significant success rate with simulation and EHR. Statistics indicate up to 70%

higher rate of adoption of EHR after use of simulation versus a more traditional approach of “train the trainer” (Haugen, 2012). The success in the simulated approach lies in the authenticity of the scenario and the ability to offer repetition and immediate feedback in a safe environment (Handley & Dodge, 2013). Therefore, simulation with EHR becomes relevant and significant to practice when it can show benefit to the organization in the form of high adoption; to the nurse in reducing anxiety and improving knowledge, skill, and attitude; and to the patient in a high quality of care.

Project Question

Does simulated training on a generic EHR system improve the knowledge, skill, and attitude of nurses with little or no experience with EHR?

Evidence-Based Significance of the Project

This project contributes to what is known about nurses and EHR by assessing the knowledge, skills, and attitudes of a select group of nurses with an EHR in a simulated setting. This information is crucial to understand because it reflects the nurses’ acceptance of and willingness to learn the IT system (de Veer & Francke, 2009; Lu et al., 2012; Nkosi et al., 2011). The HITECH Act (2009) clearly delineates a timeframe for hospitals and healthcare providers to implement HIT and demonstrate meaningful use by 2015 (Murphy, 2010; Wimberly, 2010). Therefore, it is imperative that nurses be a part of the solution and contribute to a working knowledge of integrating IT into bedside practice (Murphy, 2010).

Attitudes can affect the successful adoption of an IT system. Nurses with some previous exposure to EHR maintained a more positive attitude than those who did not

have any exposure to IT (Murphy, 2010). Training to increase the knowledge and skill levels of nurses with IT teaches nurses to use the EHR as a tool to evaluate and improve patient outcomes (Halley et al., 2009). Computer and innovation theorists have reported that the introduction of a new IT system can cause great anxiety, fear, apprehension and negative attitudes (Nkosi et al., 2011). It is recommended that institutions assess the knowledge, skills, and attitudes toward IT in order to facilitate the integration of the system (Nkosi et al., 2011). This project contributes to the existing knowledge base by examining the effectiveness of a method that addressed knowledge, skills, and attitudes of nurses who were new users with EHR. The project also contributes to validation of the DOI framework as a viable structure for conceptualizing nurses' perspectives on how EHR will influence their work at a practice level.

Implications for Social Change in Practice

According to the Institute of Medicine (IOM, 2001) the healthcare system is unorganized, is overly complex, is slow, decreases safety, wastes resources and money, leaves gaps in information and fails to present adequate care. The IOM (2001) issued a call for change by bringing state-of-the-art care to every American by making fundamental changes to the healthcare system. Healthcare lags behind other industries in adopting IT (IOM, 2001; Zhang et al., 2013). By adopting an IT system, healthcare is improved by:

- reducing errors of omission;
- diminishing number of adverse drug effects;
- decreasing number of prescription errors;

- promoting efficient physician time spent with patients;
- increasing nursing time on direct patient care;
- providing better surveillance;
- encouraging adherence to regimented and evidence-based guidelines;
- reducing inpatient days;
- enhancing integrated data review;
- positively affecting medication and non-medication quality of care measures.

(Zhang et al., 2013, p. 2)

Healthcare professionals are unsure and anxious about new technology and fear that it takes away from patient-focused care (Gregory & Buckner, 2014). However, the method of training and introduction of IT to the healthcare worker can alleviate the frustration and overwhelming nature of the technology (Goldsack & Robinson, 2014; Gregory & Buckner, 2014). The perceived ease of use of technology is considered one of the strongest predictors of IT acceptance among users (Ketikidis, Dimitrovski, Lazuras & Bath, 2012). Resistance to accepting new technology has stemmed from the lack of knowledge and negative attitude by nurses who perceive IT as a barrier (Goldsack & Robinson, 2014; Gregory & Buckner, 2014).

Technology has had a wide-ranging impact on the nursing profession (Furst et al., 2013). Nurses across the United States need to develop the skill set necessary to function in an increasingly technological environment (Furst et al., 2013; Halley et al., 2009). Nurses who acquire the skills to work with IT and the ability to influence systems that deliver safe effective patient care are invaluable (Furst et al., 2013; Halley et al., 2009).

This project contributes to social change in practice by addressing the knowledge, skills, and attitudes of nurses who were new users of IT. The project also demonstrates that training in a social context can be effective by illustrating that others have similar concerns about the changes being made. This awareness that other professionals have similar concerns facilitates a network for supporting the change even in the face of concerns because the change is deemed reasonable for the common good.

Definition of Terms

Attitude: “Manner, disposition, feeling, position, etc., with regard to a person or thing; tendency or orientation, especially of the mind” (“Attitude,” n.d.). For the purpose of this project, the term *attitude* refers to the nurses’ professional feeling towards using EHR.

Clinical Decision Support: “Health information technology functionality that builds upon the foundation of an electronic health record to provide persons involved in care processes with general and person-specific information, intelligently filtered and organized” (as cited in Wimberly, 2010, p. 228).

Comfort (verb): “1) to soothe, console, or reassure; bring cheer to (noun) 2) relief in affliction; consolation; solace 3) a feeling of relief or consolation 4) a state of ease and satisfaction of bodily wants, with freedom from pain and anxiety” (“Comfort,” n.d.). For the purpose of this project, the term *comfort* refers to the nurses’ perceived ease in using the EHR.

Electronic Health Record: “An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that

can be created, managed, and consulted by authorized clinicians and staff across more than one health care organization” (as cited in Halley et al., 2009, p. 306).

Electronic Medical Record: “An electronic record of health-related information on an individual that can be created, gathered, managed, and consulted by authorized clinicians and staff within a health care organization” (as cited in Halley et al., 2009, p. 306).

Experience: “1) a particular instance of personally encountering or undergoing something 2) the process or fact of personally observing, encountering or undergoing something 3) the observing, encountering, or undergoing of things generally as they occur in the course of time 4) knowledge or practical wisdom gained from what one has observed, encountered or undergone” (“Experience,” n.d.). For the purpose of this project, the term *experience* refers to the nurses’ previous use of technology and/or EHR.

Health Information Technology: “The application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing and use of health care information, data, and knowledge for communication and decision making” (as cited in Zadvinskis, Chipps, & Yen, 2013, p. 89).

Information technology: An umbrella term describing “all forms of technology, both hardware and software, used to create, store, exchange and use information in its various forms” (as cited in Nkosi et al., 2011, pp. 876-877).

Interoperability: “Interoperability is the essential factor in building the infrastructure to create, transmit, store, and manage health-related information” (as cited in Halley et al., 2009, p. 306).

Knowledge: “1) acquaintance with facts, truths, or principles, as from study or investigation; general erudition 2) familiarity or conversance, as with a particular subject or branch of learning 3) acquaintance or familiarity gained by sight, experience or report” (“Knowledge,” n.d.). For the purpose of this project, the term *knowledge* refers to the nurses’ familiarity with technology and/or EHR.

Meaningful Use: “Using electronic health records (EHR) technology to improve quality, safety, efficiency and reduce health disparities; engage patients and family; improve care and coordination, and population and public health; and maintain privacy and security of patient health information” (Murphy, 2010, p. 284).

Personal Health Record: “An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared and controlled by the individual” (as cited in Halley et al., 2009, p. 306).

Satisfaction: “1) an act of satisfying; fulfillment; gratification 2) the state of being satisfied; contentment 3) confident acceptance of something as satisfactory, dependable, true, etc.” (“Satisfaction,” n.d.). For the purpose of this project, the term *satisfaction* refers to the nurses’ acceptance of using EHR.

Simulation: “A technique, device or activity that aims to authentically recreate, imitate or amplify characteristics, processes and experiences of the real world for the purposes of teaching, acquiring and assessing knowledge, skills and attitudes” (Guise et al, 2012).

Skill: “1) the ability, coming from one’s knowledge, practice, aptitude, etc, to do

something well 2) competent excellence in performance; expertness; dexterity” (“Skill,” n.d.). For the purpose of this project, the term *skill* refers to the nurses’ ability to use the EHR.

Assumptions

Assumptions of this project included the fact that some nurses had little to no experience on EHR and would participate in a presurvey and postsurvey assessment of their knowledge, skills, and attitudes toward the EHR. It was also assumed that the nurses would provide factual information on the surveys to reflect any value-added learning that occurred. It was further assumed that the non-hospital-based health care facilities that were asked to participate were attempting to initiate an EHR system.

Scope

The scope of this project was limited to non-hospital-based health care facilities. These employers were chosen because of their intent to adopt an EHR system and be able to communicate via meaningful use. Starting in 2015, qualified providers (i.e. hospitals and healthcare providers) that do not show evidence of meaningful use will be penalized 3-5% of a provider’s total government-based compensation (Wimberley, 2010). However, long-term care facilities and home health care agencies are not given the incentives to implement HIT that are extended to hospitals and healthcare providers. The long-term care facilities and home health care agencies are only required to transmit information electronically on the minimum data set (MDS), outcome and assessment information set (OASIS), and some billing information (MacTaggart & Thorpe, 2013). Problems arise when the healthcare providers utilize an EHR and the facility does not.

This has motivated some long-term care facilities and home health care agencies to adopt a HIT system including an EHR at their own expense (MacTaggart & Thorpe, 2013).

Limitations

This project used a quantitative, descriptive design that utilized a convenience sampling of nurses from local non-hospital-based health care facilities in the community. Recruitment was targeted toward nurses with little to no experience with an EHR system. Participation was voluntary, limited to facilities that were in the process of adopting an EHR and that were currently using paper-based charting. Another limitation was the small sample size that could be accommodated in the simulated space. Available space was limited to 25 participants and training was offered for 1 day only. Due to these limitations, the results of this study should not be generalized. However, the findings may be applicable to some skilled facilities.

The EHR was a generic simulated web-based system called Docucare. Although the layout of future EHR may be different with each employer, the elements are similar and the rationale is the same. The EHR system is further discussed in Section 3. To address potential bias and to add validity and reliability, the pretest for attitudes toward computers in healthcare (P.A.T.C. H.) assessment scale v.3 (2011) by Kaminski (2013) was administered. The P.A.T.C.H. assessment tool v. 3 (2011) is further discussed in Section 3.

Summary

Healthcare in the United States has not kept pace with technology and has operated in “silos” (IOM, 2001). The ARRA and HITECH Acts have brought sweeping

changes to healthcare systems and nurses need knowledge and skills to navigate the changes (Dowding, 2013). Widespread adoption of HIT will require behavioral adaptations of healthcare professionals in order to provide care that does not waste time or effort and is safe and timely for all patients (IOM, 2001). Former Department of Health and Human Services (DHHS) Secretary Michael Leavitt stated,

Information technology is a pivotal part of transforming our health care system... Working in close collaboration, the federal government and private sector can drive changes that will lead to fewer medical errors, lower costs, less hassle and better care. (as cited in Halley et al., 2009, pp. 308-309)

Nurses need to be able to adapt and function successfully with IT to make informed decisions and be contributors to the transformation of the healthcare system (Halley et al., 2009).

In summary, research has shown inadequate computer skills to be a key factor in nurses' inability to take advantage of HIT (Furst et al., 2013; Nkosi et al., 2011). To empower nurses to achieve the benefit of EHR, an environment supportive of learning technology is recommended (Furst et al., 2013; Nkosi et al., 2011). Simulation is an excellent bridge for nurses who lack computer skills to successfully use HIT including EHR (Abe, Kawahara, Yamashina, & Tsuboi, 2013). Simulated activities increase confidence, improve technical skills and promote teamwork and communication (Abe et al., 2013). Outside of healthcare, consumers are integrating technology into their everyday lives and this technology is infusing new solutions into the clinical environment (Sensmeier, 2011). Nurses who can integrate this technology into practice will be crucial

to healthcare and as valuable as the technology itself (Sensmeier, 2011). An in-depth review of scholarly evidence is discussed in Section 2.

Section 2: Review of Scholarly Evidence

Introduction

The purpose of this project was to assess the effectiveness of simulated training with a generic EHR to improve the knowledge, skill, and attitude (KSA) of nurses with little or no training with an EHR. An identified problem with the adoption of EHR was a lack of basic computer skills in nurses who had no background in information technology. Up to 45% of current nurses were in the workforce before the proliferation of technology (Furst et al., 2013). Therefore, a lack of training and/or preparation with computer skills hinders the adoption of technology and leads to cognitive and attitudinal barriers (Courtney et al., 2005; Furst et al., 2013). This section addresses general and specific literature relating to knowledge, skills, and attitudes of nurses in relation to HIT and EHR. Further discussion includes a review of the topic of simulation and how it relates to EHR. The categories are delineated by general and specific literature involving KSA, simulation, and DOI. The next section addresses the theoretical framework of Rogers's DOI and how it can guide this project. Lastly, a discussion of how concepts of the DOI relate to the specific problem of this project involving nurses' KSA toward EHR.

Literature Search Strategy

An extensive literature search was conducted regarding nurses' knowledge, skills, and attitude toward EHR and IT. Using the Walden Library database, I conducted searches with Medline, CINAHL, and Cochrane Database of Systematic Reviews (English only, full text). The search was guided with the keywords *electronic health records, electronic medical records, information technology, health information*

technology, nursing informatics, hospital information systems, and subset words of *nurses, nurses attitude, nurses knowledge, and nurses skill*. To be considered for the literature review, a study had to be published in a peer-reviewed journal; the search was not limited by date of publication or to a country. The resulting search yielded a total of 1,973 articles and studies. This search was then narrowed to studies only, which yielded 485 studies. The search was further defined to studies that pertained to nurses' knowledge, skills, or attitude toward IT, which resulted in 51 studies. These studies were separated and screened for relevancy and applicability by using a literature review summary table that contained the following categories: source, purpose/problem, sample, framework, concepts, design, instruments, results, implications, and comments (Burns & Grove, 2009, p. 105).

After screening, a total of 25 studies were found to be applicable to the project and categorized by type of study: seven descriptive studies, six cross-sectional studies, two national surveys, one pre/post survey design, one longitudinal cohort survey, three literature reviews, three qualitative studies, one prospective study, and one controlled simulation study. The level of evidence was measured according to the American Association of Critical Care Nurses (AACN) guidelines. The AACN uses an alphabetical rating for its levels (A, B, C, D, E, M); A represents the highest level, and M represents the lowest (Peterson et al., 2014). The selected studies are level C, which is defined as “evidence for qualitative, integrative reviews, or systematic reviews of qualitative, descriptive or correlational studies or randomized controlled trials with inconsistent results” (Peterson et al., 2014, p. 60). Some studies were categorized as general, which

indicated a broader view of the project topics, and within this category as knowledge, skills, and attitude; simulation; and diffusion of innovation as applicable to the project. The following review category consisted of specific studies with a narrow focus on a specific area or topic related to the project; studies were divided within this category into the categories of knowledge, skills, and attitude; simulation; and diffusion of innovation, as applicable to the project.

General Literature

Knowledge, Skills and Attitudes

A literature review by Blavin, Ramos, Shah and Devers (2013) funded by the Office of the National Coordinator (ONC) for Health Information Technology of the U.S. Department of Health and Human Services reported several overarching common themes regarding adoption of EHR. Training best practices included assessing the end user's skill level and matching training to need, using multiple training approaches, employing the use of champions/super users, and extended post "go-live" support that optimized the success of implementation of the EHR. Other factors that affected the success of adoption included choosing a design that fit the needs of the organizational culture and end users, providing adequate technical support and offering continuing staff training for upgrades (Blavin et al., 2013). It was also noted that staff "buy-in" in addition to the support of management and leadership was critical to the success of the adoption of the EHR.

A literature review by Huryk (2010) examined global trends in regard to nurses' attitudes toward IT. Several studies indicated that nurses with more nursing experience

and more computer experience trusted the EHR along with the clinical decision support system to help deliver a higher standard of care. The major complaint from those who resisted the EHR involved a feeling of dehumanizing the patient, computer literacy and system downtime (Huryk, 2010). Time spent documenting on the EHR was inconsistent among the studies; however, overall consensus was positive in regard to the bar-coding medication administration function. Overall, the attitude of administration had an influence on how the IT system was perceived and affected the attitude of the nursing staff. Plans to implement IT were fairly consistent globally and it was found that a successful transition can depend on a supportive learning environment (Huryk, 2010).

Waneka and Spetz (2010) conducted a literature review on the effect that IT has had on nursing and how nursing can contribute to the success of IT systems. The type of systems reviewed included EHR, bar-coded medication administration, and immediate bedside charting termed *point of care technology*. Overall, it was found that documentation time decreased while quality of documentation increased. There were fewer recorded medication errors and time spent with patient care was not affected. Factors that contributed to successful implementation of and EHR included involving nursing in the decision-making process, supportive attitudes of administrative leaders, standardized language, and adequate training (Waneka & Spetz, 2010).

A study by Szydowski and Smith (2009) examined leadership and management trends in relation to implementing an IT system. Reasons for implementing an IT system ranged from internal efficiencies to improved access to patient data. Leaders also felt that an IT system would be a good return on investment, leading to a competitive

advantage with improved patient outcomes and satisfaction. Common barriers identified by nursing leaders were lack of computer literacy among nursing staff and the staff not recognizing the benefits of an IT system. In order to have an effective application of an IT system, it is necessary to provide adequate time to train staff and outline the benefits of adoption (Szydowski & Smith, 2009).

Ketikidis et al., (2012) surveyed clinics concerning applications of perceived utility (PU), perceived ease of use (PEOU) and attitude toward IT. The study found a positive correlation between PEOU and attitude, which in turn enhanced the PU among all end users. Shank, Willborn, PytlikZillig, and Noel (2012) surveyed community behavioral healthcare providers regarding benefits and barriers regarding an EHR. Three themes emerged; privacy and security, delivery of services, and quality of care. The providers felt that the EHR enhanced complete information, medication, and diagnoses. However, privacy and security remained concerns with unnecessary labeling of the patient. The cost of delivering this service was another concern and the results were inconsistent concerning whether the provider felt the benefit of the EHR was worth the expense (Shank et al., 2012).

A study conducted by de Veer and Francke (2010) surveyed the attitude, experience, and perceptions of Dutch nurses and nursing assistants regarding electronic patient records (EPR). In the study, 685 participants completed a questionnaire survey; this was considered a nationally representative Dutch research sample. More than half ($n=394$) of participants had never had training on an EPR and the remainder had ($n=307$). The findings indicated that the participants associated the EHR with improved and safer

patient care. The overall consensus was the EHR would increase the cost of care and increase the administrative duties as well. The study found that those who had used an EPR were more positive and accepting toward technology use in comparison to those who had not and served as role models for future adoption of the EHR (de Veer & Francke, 2010).

A national survey conducted by DesRoches, Miralles, and Buerhaus (2011) examined the experiences and perceptions of registered nurses (RNs) with IT. The results varied widely with hospital RNs reporting more use of IT than nurses in clinic or outpatient settings. Overall the report was positive concerning the use of IT but indicated that IT use should occur after a learning curve had taken place. This survey supports other studies in indicating the need for adequate training before implementing an IT system (DesRoches et al., 2011).

Kaya (2011) conducted a cross-sectional study surveying nurses' attitudes toward computers in healthcare in two Turkish hospitals. The instrument used was the P.A.T.C.H. assessment scale v.2 (2007) developed by Kaminski (2013) and with established reliability and validity. The study surveyed 890 nurses and found that in general the attitude was positive toward computers. There were a few significant differences noted on the demographics form—*younger nurses had more positive attitudes, as did single nurses. The higher the degree and job title, the more positive the attitude toward computers. The study also revealed that the more the nurse used a computer at home and work, the more positive the attitude (Kaya, 2011).*

Simulations

A study in Copenhagen by Ammenwerth et al. (2012) involved the use of simulation to try a prototype for medication management against the existing standardized system. The purpose was to assess whether the prototype increased medication safety. Ten doctors were recruited and participated in 50 timed simulations of varying situations. The results were not statistically significant but did show a tendency to improve medication safety, catch medication errors, and assist the physicians with alerts. The study found several challenges that would need to be addressed; however, the simulation is recommended as a tool for evaluation (Ammenwerth et al., 2012).

Diffusion of Innovation

Lynch et al. (2014) conducted a descriptive study of the Health IT Regional Extension Center (REC) program. The REC provided support for EHR adoption in populations that were underserved to prevent a “widening digital divide” (Lynch et al., 2014, p. 423). This population included rural and public hospitals, community health centers, and small healthcare provider practices. Collection of data was from January 2010 to June 2013 and during that time frame REC recruited nationally 44% of the primary care providers (PCPs). Results indicated that 86% were using an EHR and 48% had demonstrated meaningful use. A strategy used was taken from Rogers’s (2003) diffusion of innovative practices and involved the concept of early adopters. The study concluded that the REC contributed to the infrastructure of underserved population healthcare providers with the adoption of the EHR and meaningful use (Lynch et al., 2014).

Specific Literature

Knowledge, Skills and Attitudes

Kossman and Scheidenhelm (2008) conducted a survey of a group of nurses from a Midwestern hospital to assess the community hospital nurses' experience with EHR and the perceived effect of EHR on patient outcomes. The community hospital nurses revealed that the EHR both helped and hindered their jobs and indirectly helped and hindered patient care. The EHR was preferred for retrieving results, administering medications, and accessing history. However, a median of 50% of work shift was reported spent documenting on the EHR, decreasing time with patients, and respondents indicated that the EHR did not enhance critical thinking (Kossman & Scheidenhelm, 2008). A study 4 years later by Moore and Fisher (2012) found that nurses were still echoing this sentiment. The nurses reported that the EHR helped with the organization of test, labs, and medication; however, the EHR was still requiring a large portion of the working time during the shift for documentation (Moore & Fisher, 2012). In contrast, Carrington and Effken (2011) found that the EHR reduced nursing documentation time, decreased documentation errors, and improved overall documentation. In the study by Carrington and Effken, the nurses reported limited usefulness of the EHR to retrieve information, and felt that the EHR did not promote collaboration with other disciplines.

Ward, Vartak, Schwichtenberg, and Wakefield (2011) found that a nurse's attitude influenced the ability to successfully implement the EHR. Nurses with previous exposure to an EHR maintained a positive attitude at 6 months versus nurses who did not have exposure to an EHR. Likewise, Laramée, Bosek, Shaner-McRae, and Powers-

Phaneuf (2012) reported that nurses' adoption and advocacy of an IT system was key to its success. Nurses are the largest segment of healthcare workers, and their attitude, whether positive or negative, is the key determinant of the adoption of an IT system (Laramee et al., 2012). The study also found that while attitude worsened at 6 months, by 18 months, a slight but not significant improvement was noted. An earlier study by Nksoi et al., (2011) found that computers produced fear and anxiety in some nurses and this affected the attitude toward adoption. This did not apply to nurses who had previous exposure to or training on IT.

Whittaker et al., (2009) report that the acceptance of the EHR was dependent on how the nurse perceived its usefulness. If a nurse perceived the advantages to outweigh the barriers, then the attitude was positive. However, if a nurse lacked time management skills, and computer training and was overwhelmed with technology, the attitude was negative (Whittaker et al., 2009). A study by Lu et al., (2012) revealed similar results. The study suggested that healthcare professionals readily accept technology that is perceived as useful and has ease of use. The higher the quality of information, the more nurses will integrate the IT system into their workflow (Lu et al., 2012). Likewise, Koivunen, Kontio, Pitkänen, Katajisto, and Välimäki (2013) found that stress and pressure at work decreased if a nurse had competence to use the IT system. Stress differed by gender with female nurses reporting less stress and greater satisfaction with work than their male counterparts. Other findings in the study revealed that overall attitude toward (not use of) IT in general including the Internet, affected stress levels, with more positive attitude equaling less stress (Koivunen et al., 2013).

A study by Zadvinskis, Chipps and Yen (2013) surveyed nurses' perception of an IT system 4 months after initiation. While the nurses reported positive interaction related to medication administration and immediate feedback, other areas, including navigation, access to information, and increased documentation time, were not congruent with nursing workflow. In contrast, a study conducted by Carayon et al. (2011) found a positive experience with implementation of an EHR reported by nurses in four intensive care units (ICUs). The EHR was implemented in incremental stages with input from nurses who were invited to serve on one or more EHR implementation committees. Perceived usability and user satisfaction measures were collected by surveys at 3 months and 12 months postimplementation. Results indicated that satisfaction continued to increase, especially after the "learning curve" period, which varied by user (Carayon et al., 2011).

Simulations

Beiter, Sorscher, Henderson, and Talen (2008) conducted a longitudinal cohort survey study regarding attitudes, knowledge, skills, and needs on electronic medical records (EMR). Two groups, one with physicians ($n=19$) and the other with nurses, staff, and patients ($n=20$) were evaluated 4 weeks prior to an EMR demonstration and at 4 and 10 weeks posttest. Attitudes, knowledge, and needs demonstrated a significant improvement in both groups by post-Week 4 and were sustained Weeks 4 through 10. Skills were unchanged from baseline in both groups. The study concluded that EMR demonstration could be an effective tool to use prior to EMR implementation (Beiter et al., 2008).

Abe et al., (2013) conducted a study with 24 Japanese nurses in a simulated scenario. The nurses were from different specialties, but all received cardiovascular critical training for six months prior to the simulation. Four simulated scenarios regarding cardiovascular emergencies were presented. In each of the 4 groups, the evaluated score rose significantly on the second scenario. Also noted were the significant increases in the scores in confidence and attitude of team members (Abe et al., 2013).

Diffusion of Innovation

The study by Hsu, Liu, Weng & Chen (2013) explored the effects of the 5 characteristics of the diffusion of innovation model on IT usage; relative advantage, compatibility, complexity, observability, and trialability. The study revealed that relative advantage had no significant effect on usage, but compatibility positively affected usage and attitude. However, complexity negatively affected nurse's intention to use IT. In addition, the study found that observability of other nurses successfully using an IT system had a positive effect and increased overall willingness to use, while trialability had no significant effect (Hsu et al., 2013).

Theoretical Frameworks

Rogers's Diffusion of Innovation Theory

This project utilized Rogers diffusion of innovation theory. The diffusion of innovation (DOI) model facilitates dissemination of health behaviors to practical use (Pender, Murdaugh & Parsons, 2011). Rogers (2003) defines diffusion as, "the process in which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). This definition highlights the 4 necessary

components of DOI; 1) innovation, 2) communication channels, 3) time, and 4) social system (Pender et al., 2011; Rogers, 2003).

The innovation consists of an idea or object that is new to the user (Rogers, 2003). It is not relevant how long the idea or object has been in existence, it is the attitude and reaction to the “newness” of the idea or object that can facilitate diffusion (Rogers, 2003). Communication channels can involve multiple methods including interpersonal conversations (face-to -face, phone), mass media (television, radio, advertising), and interactive communication (Internet, social media, email) (Rogers, 2003). Time is the third step and involves the innovation-decision process. These are the steps in which the individual first learns of the innovation until the time the innovation is adopted or rejected (Rogers, 2003). This timeframe varies depending upon the innovation and the social system. The last component is the social system, which can be any group, formal or informal, that joins together in a common goal (Rogers, 2003). The speed of adoption will depend on relative advantage, compatibility, complexity, trialability, and observability (Berwick, 2003; Pender et al., 2011; Rogers, 2003). Innovations that are perceived as having these 5 characteristics have the most influence over the rate of adoption (Rogers, 2003).

There are 5 adopter categories; innovators, early adopters, early majority, late majority, and laggards (Berwick, 2003; Pender et al., 2011; Rogers, 2003). The innovators are described as adventurous, daring, and risk-takers (Rogers, 2003). Innovators are willing to cope with a high degree of risk and understand complex ideas. Early adopters are considered the change agents who can tip the critical mass for

adoption of an innovation (Rogers, 2003). Early adopters are more locally integrated with a high population of opinion leaders. Early majority are described as deliberate adopters (Rogers, 2003). Early majority represent one-third of the categories and will adopt just before the average group. Late majority is considered skeptical and will adopt with peer pressure (Rogers, 2003). Laggards are labeled as traditional and prefer to do it as previously done (Rogers, 2003).

The DOI model has multilevel change processes that can promote behavior change at a widespread level (Pender et al., 2011). Healthcare has a wealth of new evidence-based innovations; yet has been slow to adopt (Berwick, 2003). Leaders who want to foster innovation of EHR will need to recruit the opinion leaders and demonstrate the relative advantage of adoption. By reducing the uncertainty of the EHR, opinion leaders can fully embrace the change and help lead the adoption (Berwick, 2003). The framework of DOI was compatible with the process of implementing an EHR and provided clear guidance and support for the project.

Primary Writings of Rogers

The 2003 diffusion of innovations is the 5th edition by Everett Rogers since 1962. Rogers states that his DOI theory has been modified over years and adopted widely around the world (Rogers, 2003). Areas that have utilized DOI include agriculture, marketing, public health, communications, and technology (Rogers, 2003). Rogers has conducted research worldwide to apply the DOI theory. He has lectured around the world and has been faculty at several universities including Michigan and Albuquerque (Rogers, 2003). Rogers' primary writings lend themselves to the theory of DOI and this

framework has been recently utilized in public health and technology as the 5th edition illustrates. The success in which DOI theory has been applied to both public health and technology illustrates a positive precedence for application to adoption of HIT.

Literature Related to Methods

The literature has revealed a link between nurses' KSA and the successful adoption of EHR (Carrington & Effken, 2011; Huryk, 2010; Ketikidis et al., 2012; Nksoi et al., 2011; Ward et al., 2011). The link between simulation and EHR was positive but the literature was limited yet growing (Abe et al., 2013; Ammenwerth et al., 2012; Beiter et al., 2008). The literature search revealed DOI use in healthcare was plentiful (Rogers, 2003). However, specific literature linking DOI to EHR adoption was just in beginning stages (Furst et al., 2013; Hsu et al., 2013; Kaya, 2011; Lynch et al., 2014; Murphy, 2010; Nkosi et al., 2011). This project was implemented to demonstrate how DOI's innovation-decision process facilitated adoption of EHR among nurses with little to no experience with EHR. The innovation-decision process was the beginning process that started the adopter to initiate the 5 characteristics of innovation (Rogers, 2003).

Summary

A consensus of the general literature search on the integration of EHR in healthcare revealed several common themes experienced across the nation. These themes included matching training to the user's skill level, having post "go live" support, feelings of being overwhelmed and unfamiliarity with technology, fear of dehumanizing the patient, and systems that were incongruent with the nurse's work load. The specific literature search revealed several common themes specific to nursing. Once trained to the

EHR, nurses reported the EHR was helpful in retrieving information such as labs and tests. However, multiple complaints were found regarding the decrease in efficiency due to computer charting. The major factor in the acceptance of the IT system depended on how useful the system was perceived by the nurse. The attitude of the nurse affected the acceptance or rejection of an IT system.

Simulations have shown to be a positive experience and are recommended as a training and evaluation method (Ammenwerth et al., 2012). These findings also tie into the DOI model where promoting champions or super users of the system can promote diffusion of the EHR. The support of administration, extended training, and the use of the “unofficial” leaders of the organizations’ culture successfully integrated an HIT system. If other nurses observed their co-workers successfully utilizing the EHR, the observation influenced the opinions, and promoted the belief that they too could be successful (McAlearney et al, 2012, Rogers, 2003).

What was not known through the literature was whether implementing simulated training on an EHR would be cost effective for non-clinically-based facilities (i.e. long-term care and home health agencies). It was recognized that cost could be a prohibitive factor; therefore, it is recommended that the option of community partnership between non-clinically-based facilities and colleges/universities be explored (Cato & Abbott, 2006).

Leaders and administration can help ease the transition by addressing the anxiety and promoting a safe learning environment while advancing nursing practice (Lu et al., 2012; Sensmeier, 2011). Multidisciplinary professionals dominate healthcare; therefore

collaboration is necessary to ensure quality care of the patient. Information that is integrated and available to all healthcare providers can be more responsive to the acute and chronic needs of the patient (IOM, 2001; Lu et al., 2012). Communication between all disciplines is crucial to efficient, effective and safe care, and can be enhanced by HIT (IOM, 2001; Lu et al., 2012). A discussion on the project's approach including method, population sampling, instrumentation, data collection, and analysis is presented in the following section.

Section 3: Approach

Introduction

The purpose of this project was to assess the effectiveness of simulated training with a generic EHR to improve the knowledge, skill, and attitude of nurses with little or no training on an EHR. An identified problem with the adoption of EHR is lack of basic computer skills in nurses who have no background in information technology. This project was conducted to gain further insight into successful methods of and potential barriers to adopting EHR from a nursing point of view. This section addresses the design/methods, population, recruitment, sampling, setting, instruments, protection of human subjects, data collection, and analysis that were implemented for the project.

Background

The local community college involved in this study is part of a statewide system that has 14 regions with classes offered in 75 communities and 32 degree-granting locations. The local region has 4 campuses and admits all levels of nursing students; practical nurse (PN), associate degree nurse (ASN), and licensed practical nurse-associated degree nurse (LPN-ASN). At any given time there are 240 students in various stages of nursing education.

I am a member of the nursing faculty at the local community college; however, this project was done outside of the faculty role. The college hosted the project in its simulation lab to support local employers and my pursuit of higher education. I have not provided training to any of the potential participants, nor hosted clinical students at any of the participating facilities. There was no conflict of interest or biases to declare.

Project Design/Methods

This study used a quantitative approach. A quantitative research design allows for use of an objective approach to report a phenomenon or behavior that occurs (Terry, 2012). The design was a pretest-posttest survey using the P.A.T.C.H. assessment scale v. 3 (2011) and was administered to a group of nurses before and after the generic EHR training. The use of a survey allowed the collection of facts, perceptions, opinions, attitudes, and behaviors of the participants (Terry, 2012).

The most common method of measuring attitude is through a survey (Stronge & Brodt, 1985). A survey allows the participant time for reflection on the subject. It also provides anonymity and does not allow the surveyor to influence the responses (Stronge & Brodt, 1985). A Likert scale is a frequently used measure for survey responses (Abe et al., 2013; Kaya, 2011; Hsu et al., 2013; Laramée et al., 2012; Lu et al., 2012; Ward et al., 2011). There are two common methods used to administer a survey—as a questionnaire or as a pretest-posttest related to an intervention (Abe et al., 2013; Kaya, 2011; Hsu et al., 2013; Laramée et al., 2012; Lu et al., 2012; Ward et al., 2011). Based on the purpose of this project, a pretest-posttest survey method was selected. A pretest-posttest survey design assessed IT-related knowledge before and after an intervention in the same group (Terry, 2012).

Using a survey allowed a comparison to be explored regarding knowledge, skill, attitude, comfort, and satisfaction with using an EHR. Simulated training on an EHR assists a nurse in developing new skills needed in the transition to different types of EHR software (Ouellette, 2012). The training was conducted in the simulation lab of the local

community college as per partnership agreement with non-hospital-based clinical settings for training purposes.

Population

Local non-clinical-based healthcare providers, specifically long-term care facilities and home health care agencies, do not have a mandate by ARRA to adopt EHR (Abramson et al., 2014; Bercovitz, Park-Lee, & Jamoom, 2013). Therefore, data revealed that the rate of adoption of EHR by long-term care facilities varies widely, at 18% to 47% (Abramson et al., 2014). Estimates from the National Home and Hospice Care survey (2007) revealed that approximately 54% of home care agencies had adopted EHR and mobile technology (Bercovitz et al., 2013). In the local community, there are 11 long-term care agencies and six home health care agencies. Of the long-term care agencies, five (45%) have implemented a type of EHR system. Of the home health care agencies, three (50%) have implemented a type of EHR system. The remaining six long-term care agencies and three home health care agencies were invited to participate in the simulated EHR training for 1 day only.

Recruitment

Recruitment consisted of posting flyers at each of the participating agencies describing the project. This was initiated 2 weeks prior to the date of the project and was on a volunteer basis only. The number of participants was limited to 25 based on the number of computers available.

Sampling

The sample was a convenience sampling and was composed of licensed practical

nurses (LPNs) and registered nurses (RNs) with little or no experience with EHR. The participants worked in a non-clinical-based facility (i.e. long-term care or home health care agency) were over the age of 18, were able to read and speak English, and were either male or female.

Setting

The setting was a local community college simulation lab. The college has a collaborative affiliation agreement with the majority of the healthcare providers in the community including non-clinical-based employers. The simulation lab is used by all healthcare departments in the college as well as by local hospital for training of students and employees in various healthcare-based scenarios. The equipment in the lab ranges from low fidelity to high fidelity and includes an advanced simulated EHR system- DocuCare-for charting. DocuCare was developed by nurses at the University of Tennessee as a learning tool for simulated training on an EHR system (Ouellette, 2012). This EHR system allows for customized scenarios based on the skill level of the user and is a global web-based system that is accessed via the Internet. There were 25 available computers provided for simulation. A safe environment in which users can examine an EHR system and technology without fear of harm, using role-play exercises in real-world scenarios, is beneficial to learners (Culley et al., 2012).

Instrument

The instrument used was the Pretest for Attitudes Toward Computers in Healthcare (P.A.T.C.H.) assessment scale v. 3 (2011, Kaminski, 2013). Originally created in 1996 by June Kaminski for her students to examine attitudes about computers

in healthcare, it has undergone revisions—a second in 2007 and a third in 2011 (Kaminski, 2013). The P.A.T.C.H. assessment scale tool v. 1 (1996) and v. 2 (2007) have been used worldwide in various settings, and validity and reliability are well established (Kaminski, 2013). The most recent study by Kaya (2010) used the P.A.T.C.H. assessment scale v. 2 (2007). Kaya (2010) performed a test of reliability with a test-retest and internal consistency; validity was assessed with criterion-related validity. Test-retest reliability of items was 0.20 to 0.77 and 0.85 for the total scale. Internal consistency with the scale's corrected item-total correlation was 0.06 to 0.68, and Cronbach's alpha was 0.92. Concurrent validity examined the correlation between the Attitudes Towards Computers scale and the P.A.T.C.H. assessment scale, which was found to be positive and significant ($r = 0.66, P < .01$). Therefore the P.A.T.C.H. was concluded to be reliable (Kaya, 2010).

The P.A.T.C.H. assessment scale v. 3 (2011) was designed to assess a nurse's attitudes toward computers in healthcare. It was updated in 2011 to reflect statements regarding social media, EHR, mobile technology, and ehealth and to streamline the scoring process (Kaminski, 2013). The P.A.T.C.H. assessment scale v. 3 (2011) tool had 50 questions that were ranked using a 5-point Likert scale: 1—*strongly agree*, 2—*agree*, 3—*not certain*, 4—*disagree*, and 5—*disagree strongly* (see Appendix A). A pilot was conducted to provide feedback and to estimate time to complete the survey. The P.A.T.C.H. assessment scale v. 3 (2011) is available for use off the Internet at <http://nursing-informatics.com/niassess/plan.html> (see Appendix B). Permission to use the P.A.T.C.H. assessment scale v.3 (2011) was received from the author (see Appendix

C).

Data Collection

On the designated date of the project, volunteer participants were welcomed and given an overview of the day's events and scheduled time frame. Oral informed consent was provided with written consent waived as participation in the project indicated consent (U.S. Department of Health and Human Services, 2009). Next, the P.A.T.C.H. assessment scale v. 3 (2011) was administered for a pretest survey. Each assessment packet had two surveys and was assigned a number from 1-25, with the letter "a" indicating pretest and the letter "b" indicating posttest. Each participant was instructed to complete the survey with the letter "a" for the pretest. Following the pretest, the training on the simulated EHR system (DocuCare) was provided. Breaks were offered periodically. After the training, the second administration of the P.A.T.C.H. assessment scale v. 3 (2011) was conducted. Each participant was instructed to complete the survey with the letter "b" on it for the posttest. At that time, the participants were thanked for volunteering, and the session was over. The session lasted approximately 3 hours and 30 minutes.

Protection of Human Subjects

Permission to conduct this project was received from Walden University's Institutional Review Board (IRB). A form of consent (oral) was provided that informed all participants of the purpose of the research, the expected participation, procedures, any risks or benefits, and confidentiality issues, and whom to contact for any questions and concerns. Participants were told that participation was voluntary and that they could

withdraw at any time (U.S. Department of Health and Human Services, 2009). Each survey was numbered and did not contain any personal identifying markers. All forms have been kept in a locked filing cabinet inside a locked office to which only I have the key. A letter of cooperation and consent to use the community college simulation lab was obtained. Walden University's approval number for this study was 01-27-15-0380810.

Data Analysis

Scoring of the P.A.T.C.H assessment scale v. 3 (2011) was based on responses to positive and negatively worded statements. For the positive statements, (Items 1, 2, 4, 6, 7, 8, 11, 12, 16, 17, 18, 19, 21, 24, 29, 31, 33, 34, 36, 37, 42, 43, 46, 48, & 50) the score was based on the Likert rating chosen: 1 = 2 points, 2 = 1.5 points, 3 = 1 point, 4 = 0.5 point and 5 = 0 points. For the negative statements, (Items 3, 5, 9, 10, 13, 14, 15, 20, 22, 23, 25, 26, 27, 28, 30, 32, 35, 38, 39, 40, 41, 44, 45, 47, & 49) the score was based on the Likert rating chosen: 1 = 0 points, 2 = 0.5 point, 3 = 1 point, 4 = 1.5 points and 5 = 2 points (see Appendix D). The sums of the two statements were added together to achieve a final total. The total of the sums ranked from 0-100 and was as follows:

0 to 17 points—positive indication of cyberphobia

18 to 34 points—indicates some uneasiness about using computers.

35 to 52 points—moderate comfort in using computers

53 to 69 points—feels comfortable using user-friendly computer applications

70 to 86 points—confident of ability to use a variety of computer programs

87-100 points—very confident that they can learn to use a computer to boost

creativity and to perform routine functions. (Kaminski, 2013; see Appendix E)
Tallying of the scores was done by hand and the results were displayed as percentages.

Summary

The use of simulation in training with EHR provides an opportunity for the learner to practice without the risk of error in a real-life situation (Haugen, 2012). This opportunity allows for increased knowledge of an EHR system, decreases anxiety and increases the feeling of confidence to adopt the HIT (Haugen, 2012). Statistics show that healthcare providers who use simulation technology to learn technology have a 70% higher adoption rate than those who use “train the trainer” method (Haugen, 2012). Nursing knowledge, skills, and attitude toward HIT can and does affect the successful adoption of the technology (Courtney & Alexander, 2005; Goldsack & Robinson, 2014; Nksoi et al., 2011).

Collaborative partnerships between community colleges/universities and local healthcare providers can prove beneficial to both parties (Cato & Abbott, 2006). The literature review conducted by Blavin et al. (2013) found support in the literature for the notion that training programs that include active learning (i.e. scenario-based learning) lead to better outcomes. Incorporating the “human element” (i.e. leadership and target population) into the program development will result in a smoother transition and garner more support for the HIT (Blavin et al., 2013; Hodges & Videto, 2011). By surveying nurses with little to no experience on an EHR, employers can gain valuable information on areas that need to be addressed. This intervention was conducted in an attempt to reduce the implications of no previous training on an EHR system. Involving nurses from

the start can initiate the innovation-decision process that is valuable to the success of HIT adoption (Courtney & Alexander, 2005; Goldsack & Robinson, 2014; Nksoi et al., 2011). Nursing must be able to move forward and adjust to the transformation that is occurring in healthcare in order to translate knowledge into practice (Halley et al., 2009; Ozbolt & Saba, 2008). When used to its fullest extent, the EHR can serve as a tool to promote health and prevent disease (Furst et al., 2013).

Section 4: Findings, Discussion, and Implications

Introduction

The purpose of this project was to assess the effectiveness of simulated training with a generic EHR to improve the knowledge, skill, and attitude of nurses with little or no training on an EHR. The project question was as follows: Does simulated training on a generic EHR system improve the knowledge, skill, and attitude of nurses with little or no experience with EHR? This project was conducted to measure (a) nurses' knowledge, skill, and attitude concerning EHR, (b) nurses level of comfort using the EHR, and (c) nurses' level of satisfaction with training on EHR (Culley et al., 2012; Nkosi et al., 2011).

An identified problem with the adoption of EHR was a lack of basic computer skills in nurses who have no background with information technology. Up to 45% of current nurses were in the workforce before the proliferation of technology (Furst et al., 2013). Therefore, a lack of training and/or preparation with computer skills has hindered the adoption of technology and led to cognitive and attitudinal barriers (Courtney et al., 2005; Furst et al., 2013).

To address the problem of HIT adoption, this project was implemented to locally reduce the impact of lack of training on EHR through the use of simulation. Although the major healthcare providers in my local community (i.e. hospitals) have converted to an EHR, other healthcare providers (i.e. long-term facilities and home health care agencies) remain on a paper-based system. These community clinically-based employers are in various planning stages to implement an EHR and training for healthcare professionals is necessary. As many of the nurses and staff have not charted with an

EHR, simulated training was anticipated to be beneficial (Cato & Abbott, 2006; Culley et al., 2012). Using a quantitative approach, the pretest-posttest surveys with the P.A.T.C.H. assessment scale v. 3 (2011) revealed a positive increase in the attitude of the nurses and self-efficacy toward the EHR system.

Findings and Discussion

Findings With Evidence Support

Current literature revealed that attitude could affect the successful adoption of an EHR system (Furst et al., 2013; Hsu et al., 2013; Kaya, 2011; Lynch et al., 2014; Murphy, 2010; Nkosi et al., 2011). It was recommended that institutions assess the knowledge, skills, and attitudes towards IT in order to facilitate the successful adoption of systems (Furst et al., 2013; Kaya, 2011; Murphy, 2010; Nkosi et al., 2011).

Understanding how nurses interact with an IT system can have an impact on nurse-sensitive patient outcomes and overall patient quality of care (Waneka & Spetz, 2010). There is limited research on how the theory of DOI interacts with nurse's acceptance of EHR (Hsu et al., 2013; Lee, 2004; Menachemi, 2006). This project contributes to the existing literature by comparing the effects of a simulated intervention with an EHR guided by the DOI model.

There were 13 participants in this study-11 licensed practical nurses (LPNs) and two registered nurses (RNs), nine women and three men. Each nurse completed a pretest and posttest survey (see Appendix A), which was scored according to the assigned P.A.T.C.H. assessment scale v. 3 scoring tool against the selected numbers on the Likert scale (see Appendix D). The overall survey results are compared in Table 1. Each

posttest survey yielded a positive increase in the score (with increases ranging from 0.5 to 5 points), with an average pretest score of 54.23 and an average posttest score of 57.42 on a scale of 0-100.

Table 1

Overall P.A.T.C.H. Survey Results

Survey number	Pre-survey score	Post-survey score	Point difference
1	54	58.5	4.5
2	59	64	5
3	67.5	68	0.5
4	63.5	65.5	2
5	42	45	3
6	64	67.5	3.5
7	44.5	49.5	5
8	53.5	57	3.5
9	54	55.5	1.5
10	36.5	40.5	4
11	54.5	58.5	4
12	58	61	3
13	54	56	2

Each score was compared to a category as assigned by the P.A.T.C.H. assessment scale v. 3 score interpretations (see Appendix E): Category 1 = 0–17 points; Category 2 = 18–34 points; Category 3 = 35–52 points; Category 4 = 53–69 points; Category 5 = 70-86 points; and Category 6 = 87–100 points (Kaminski, 2013). Surveys 5, 7, and 10 began and increased in Category 3 (23%; $n = 3$), which reflected “moderate comfort in using computers, has basic knowledge of computers and applications, limited awareness of applications of computer technology in healthcare” (Kaminski, 2013). Surveys 1, 2, 3, 4, 6, 8, 9, 11, 12, and 13 began and increased in Category 4 (77%; $n = 10$), which reflected “feels comfortable using user-friendly computer applications, aware of the usefulness of

computers in a variety of settings, has a realistic view of current computer capabilities in healthcare” (Kaminski, 2013).

Findings With Framework Support

This project was conducted to demonstrate how DOI’s innovation-decision process could facilitate adoption of EHR among nurses with little to no experience with EHR. The characteristics of innovation-relative advantage, compatibility, complexity, trialability, and observability-have had the greatest impact on the speed of adoption (Rogers, 2003).

To illustrate how the DOI model can guide the adoption of the EHR, the survey questions were assigned to the five characteristics of innovation-relative advantage, compatibility, complexity, trialability, and observability-based on their definition and the content of the question (see Appendix F). Once the survey questions were divided into the five characteristics, the scores for each question were tallied for each survey to achieve a pretest and posttest score to assess the influence of each step. The results are provided in Table 2.

Relative advantage was the second largest gain in points, with an overall 8.5-point increase from pretest to posttest. *Relative advantage* is “the degree to which an innovation is perceived as better than the idea it supersedes” (Rogers, 2003, p. 229). Some diffusion scholars have discovered that a strong predictor of adoption is relative advantage (Rogers, 2003). Factors involved in relative advantage can include savings of time, effort, and money along with immediate results that can lead to a reduction in uncertainty (Hsu et al., 2013; Lee, 2013; Rogers, 2003). Nurses must recognize the

relative advantage of using IT. Computer competencies in healthcare are now essential for nurses (Kaya, 2011).

Table 2

P.A.T.C.H. Survey fit with Diffusion of Innovation

Diffusion of innovation concept	P.A.T.C.H. Survey questions	Pre-survey score	Post-survey score	Point difference
Relative advantage	1, 2, 11, 15, 19, 20, 21, 35, 48, 49	145.5	154	8.5
Compatibility	5, 7, 9, 10, 16, 23, 25, 26, 28, 32, 38, 39, 40	188	199.5	11.5
Complexity	3, 4, 6, 13, 14, 17, 18, 22, 29, 30, 31	129.5	137	7.5
Trialability	8, 12, 27, 34, 36, 43, 45, 46	120	127	7
Observability	24, 33, 37, 41, 42, 44, 47, 50	121.5	128	6.5

Compatibility had the largest gain in points, with an overall 11.5-point increase from pretest to posttest. *Compatibility* is “the degree to which an innovation is perceived as being consistent with existing values, past experiences and needs of potential adopters” (Rogers, 2003, p. 241). Compatibility is closely associated with sociocultural value, beliefs, and attitudes (Rogers, 2003). Research has shown that nurses’ attitude is critical to the effective acceptance of an IT system (Furst et al., 2013; Hsu et al., 2013; Kaya, 2011; Lynch et al., 2014; Murphy, 2010; Nkosi et al., 2011). Compatibility that

works with individual skill and style has been associated with significant satisfaction and continued use (Hsu et al., 2013).

Complexity was the third largest gain in points with an overall 7.5-point increase from pretest to posttest. *Complexity* is “the degree to which an innovation is perceived as difficult to understand and to use” (Rogers, 2003, p. 257). Simple innovations are adopted faster and spread more quickly (Berwick, 2003; Lu et al., 2012; Hsu et al., 2013; Lee, 2004; Rogers, 2003). An IT system is more readily adopted if the system is user-friendly and the user has had some previous exposure to computers (Carayon et al., 2011; Kaya, 2011; Ketikidis et al., 2012; Lu et al., 2012; McBride et al., 2012).

Trialability was the fourth largest gain in points with an overall 7-point increase from pre-test to post-test. *Trialability* is “the degree to which an innovation may be experimented with on a limited basis” (Rogers, 2003, p. 258). Simulation scenarios with an EHR provide a “hands-on” type environment where the nurse can experiment with the system without fear of failure or harm (Abe et al., 2013; Handley & Dodge, 2013; Haugen, 2012).

The final category of observability had the lowest in gain in points with an overall 6.5-point increase from pretest to posttest. *Observability* is “the degree to which the results of an innovation are visible to others” (Rogers, 2003, p. 258). This area can be critical because nursing relies the success or failure of an intervention in order to make adjustments to the plan of care (Carayon et al, 2011; Lee, 2004). Therefore, the ability to observe the result becomes a factor in the successful adoption of an innovation (Carayon

et al., 2011; Lee, 2004; Rogers, 2003). It is important that nurses be able to identify that they make a difference using IT and engaging in meaningful use (McBride et al., 2012).

Recommendation for Practice

An improvement was noted in participating nurses' level of attitude, comfort, and satisfaction with EHR as indicated by the increase in all areas of the P.A.T.C.H. assessment scale v. 3. The use of simulation for EHR offers a learning environment that can bridge different levels of learning, upgrade skill levels and improve communication and teamwork (Abe et al., 2013; Handley & Dodge, 2013; Haugen, 2012). Nurses represent the largest group in the healthcare field (Courtney et al., 2005; Lee, 2004; Lu et al., 2012). Therefore, nurses will become the largest group of technology users (Lee, 2004; Lu et al., 2012). Studies have found compatibility and observability to be critical factors in the adoption of IT (Hsu et al., 2013). To promote compatibility and observability, a recommendation in the current literature is to involve nurses in the process of feedback on usability and user-friendly changes by offering training on multiple levels (de Veer & Francke, 2009; Hsu et al., 2013; Lu et al., 2012).

Applicability of Findings

The applicability of these findings to healthcare is positive. Employers under the mandate of ARRA and the HITECH Act to enact meaningful use would benefit from providing training to reach the levels of all learners. This would promote communication, self-efficacy, time-management skills and adoption/acceptance of technology in the workplace (Courtney et al., 2005; de Veer & Francke, 2010; Lu et al., 2012). Employers that are not required under the ARRA and HITECH Act (i.e. long-term

care facilities and home health care agencies) to mandate meaningful use and are in various stages of implementing an EHR system can benefit from the use of simulated training on an EHR system.

Implications

Policy and Practice

The HITECH Act and meaningful use have changed the face of healthcare and nursing is in various stages of adapting to the change. Computer skills are now considered essential for nurses (Kaya, 2011). However, approximately 45% of the current nursing workforce became nurses before the proliferation of computers and this needed skill (Furst et al., 2013). Therefore, a lack of preparation and unclear understanding of IT and its associated benefits hinder the adoption this technology (Furst et al., 2013; Gregory & Buckner, 2014; Kaya, 2011; Sensmeier, 2010).

Healthy People 2020 set as one of its goals to advance the use of HIT in order to enhance overall population health outcomes (DHHS, 2014). Research has shown that nurses' attitude toward computers plays a major part in the successful adoption of IT (Furst et al., 2013; Kaya, 2011). Addressing fear of computer use, lack of training and the overwhelming nature of technology will increase the potential for success (Gregory & Buckner, 2014).

When implementing new policies/practices for EHR, an important consideration for employers is the need to provide training in a safe yet authentic environment that allows for feedback. Benefits of using EHR are delayed if adequate training and the chance for end users to adopt the new system are not considered (Haugen, 2012; Kaya,

2011). The end users attitude and resistance to adoption serve as a barometer of how prepared the organization is for the implementation of an HIT system (Haugen, 2012).

Health IT professionals believe that the next big hurdle is technology integration and interoperability (Gregory & Buckner, 2014). In order for HIT to achieve its full capability, nurses must be able to communicate effectively through technology (Gregory & Buckner, 2014). Interdisciplinary communication is key to promoting the potential of HIT and creates a safe and efficient environment for the patient (Furst et al., 2013; Gregory & Buckner, 2014). Nurses must become contributors to the function and implementation of an HIT system to better understand how it is applicable to the profession (Carayon et al., 2011). This process can be initiated through the use of simulation. New policies and practices for an EHR can promote strategic integration and adoption through the use of simulation training. The use of simulation can present training that meets the skill level of the nurse and support a learning environment that increases self-efficacy and facilitate nursing involvement in HIT (Furst et al., 2013; Gregory & Buckner, 2014).

Research and Social Change

The results of this project are consistent with the literature and current research and illustrate the importance of addressing the need for interactive training. Nurses will more readily adopt and accept technology if it is perceived to have relative advantage (be better than the current system); compatibility (fit with nursing practice and how the nurse can deliver care); limited complexity (be user friendly); trialability (be able to be used in

an nonthreatening area); and observability (demonstrate the benefit to the patient and nurse: Courtney et al., 2005; de Veer & Francke, 2010; Lu et al., 2012; Rogers, 2003).

The HITECH Act is now encouraging the adoption of an IT system and not knowing an EHR system is no longer supported. Possession of computer skills and competency is now essential for nurses (Kaya, 2011). Current research on nursing attitudes toward computer skills reveals that higher education is associated with a positive outlook toward technology (Kaya, 2011). For the nurses who have been in the profession since before the advent of current technology, education is the key to success. Nurses are responsible for integrating multiple elements of information and coordinating the services of care providers. The use of HIT can help enhance the efforts of the nurse and improve the efficiency of care (Courtney et al., 2005). To this end, effective and supportive training must be provided to facilitate understanding and acceptance of HIT (Courtney et al., 2005; Kaya, 2011). Therefore it is crucial to obtain a nursing perspective when implementing an IT system to facilitate the successful adoption and integration of the system (Carayon et al., 2011; Courtney et al., 2005; De Veer & Francke, 2010; Lu et al., 2012; Nkosi et al., 2011).

Simulation training is based in adult learning principles and the need for adding experiences to one's existing framework of knowledge (Guise et al., 2012). Simulations can address the crucial step of complexity and observability by training on usability, increasing skill, improving attitude, and providing immediate feedback (Guise et al., 2012). This project contributed to social change in practice by enhancing the awareness of EHR in nurses who are new users of IT. Further research is needed on the

effectiveness and feasibility of simulation and EHR training, which can lead to larger social change and greater adoption of technology in healthcare.

Project Strength and Limitations

One of the strengths of this project was the willingness of nurses to participate in a 1 day only simulation training session on EHR. Another strength of the project was in its simplicity. The simulated EHR system was user friendly and easily taught while presenting strong scenario for charting. The time frame was short and the information was not overwhelming in nature. Limitations included: 1) the event was held for 1 day only; 2) using a convenience sampling of volunteers willing to participate; 3) only 13 participants attended. The relatively small scope of this project limits generalization of the results to an individual level and are not to be applied to the larger population. Due to this limitation, the results cannot be stated to contribute to actual knowledge or skill but can contribute to awareness of charting on an EHR.

Recommendation for future projects would include allowing for an extension of timeframe in order to maximize the number of volunteers and to enhance generalizability of the results. Multiple training sessions should be offered to accommodate the learning levels of the nurse. Nursing does have different needs from other healthcare providers due to the complex nature of their role in healthcare. The ability to learn how to use an HIT system is crucial. The value of accepting technology cannot be underestimated (Courtney et al., 2005; Kaya, 2011).

Future projects could also include involving a collaborative agreement between healthcare employers and community colleges/universities to provide training on a

simulated EHR for nurses who need this training. The community leaders should take a lead role in this initiative and transform delivery of care at the local level. This collaboration will strength the community and facilitates adoption and acceptance of HIT in nursing.

Analysis of Self

This educational journey has been ongoing since I became a nurse. With the completion of each degree, I experienced professional growth and enrichment. This terminal degree will lend professional credibility to my desire to be a strong advocate to the nursing profession. In this section, I reflect on my role as a scholar, practitioner and project manager that connects to my long-term goals and professional development.

In my role as a scholar, I have come to understand the importance of evidence-based practice (EBP) in the nursing profession. I have had the opportunity during my practicum to participate in multiple research projects that have contributed to the knowledge of the profession. I am now able to effectively review research articles and interpret the presented findings with knowledge and professional scrutiny. I can more fully appreciate the process of literature review, data collection, and the presentation of results along with the potential contribution to EBP in nursing. As a scholar, I am able to participate in key meeting, represent nursing, and bring to the table EBP findings that promote and support the profession.

As a practitioner, I have become more effective in presenting nursing practice knowledge and skills that advance the profession. I am able to utilize EBP research in the classroom and knowledgeably promote the application of the findings. By example, I

am able to encourage lifelong learning and promote health care on a local and state level. Opportunities to serve on multiple committees at each level have presented themselves and I am embracing the challenges presented.

Lastly, as a project manager, I am able to illustrate the organizational skills that have been developed in this educational journey that can advance the practice of nursing. I have come to more fully appreciate the need to include key stakeholders from the beginning and to involve inter and intradisciplinary members. Although the different viewpoints can make for lively discussions, it is the diversity that makes the projects strong and productive. I am able to effectively communicate and negotiate with stakeholders and contribute to the outcomes that improve nursing and the community.

In summary, the DNP project has contributed to my professional growth as a scholar, practitioner and project manager. I have been able to start a project from the beginning and see it through to completion by navigating the multiple steps and levels necessary to conduct research, implement, and disseminate findings. It is very rewarding to have been an active participant in the contribution to EBP of the profession and something to speak of with pride. I will continue to be a lifelong learner and use this terminal degree as my anchor in the profession.

Summary

Simulation has advanced from a learning tool to a complex system that allows authentic interaction in delivery of context in a safe, nonthreatening environment (Guise et al., 2012; Handley & Dodge, 2013). Using simulation to train nurses on an EHR system allows the nurse to practice and repeat steps as needed to accommodate learning

styles thus enhancing confidence and efficiency (Guise et al., 2012; Handley & Dodge, 2013). This project illustrated the positive effects of enhanced awareness on nurses who have little to no training on an EHR system and the potential success if such a program were in place. Employers and community colleges and/or universities would benefit from a mutual collaborative agreement in utilizing combined resources to promote the welfare of the community. Technology has had a wide-ranging impact on the nursing profession and nurses must now adapt to the new trend (Furst et al., 2013). Nurses across the United States will need to develop the skill set necessary to function in the increasingly technological environment in order to provide effective care (Furst et al., 2013; Halley et al., 2009). Once nurses acquire the skills to work with IT, the ability to influence systems that deliver safe effective patient care will be invaluable (Furst et al., 2013; Halley et al., 2009).

Section 5: Scholarly Product

Abstract

Purpose - To assess if simulated training on a generic electronic health record (EHR) system improved the knowledge, skill and attitude of nurses with little or no experience with EHR.

Background - Healthcare is moving toward integrating technology into all professions including nursing. However, up to 45% of current nurses were in the workforce before the proliferation of technology. Therefore, a lack of training with computer skills has hindered the adoption of technology and led to cognitive and attitudinal barriers.

Methods – Using Roger’s diffusion of innovation as a conceptual framework, specifically the five characteristics of innovation, a quantitative study with pre and post survey using the P.A.T.C.H. assessment scale v.3 was conducted with volunteer nurses using a generic simulation of an EHR.

Findings - The results were tallied using the survey’s tools scoring system and revealed a positive improvement in the attitude of the nurses and self-efficacy toward the EHR system. Each posttest survey yielded a positive increase in the score with the range from 0.5 to 5 points increase with the average pretest score of 54.23 and average posttest score of 57.42 on a scale of 0-100.

Conclusion - The use of simulation for EHR offers a learning environment that can bridge the different levels of learning and upgrade skill. The results of this project are consistent with the literature and illustrate the importance of addressing the need for interactive training.

Nurses Knowledge, Skill and Attitude Toward Electronic Health Records (EHR)

Introduction

The American Recovery and Reinvestment Act (ARRA, 2009) and the attached Health Information Technology for Economic and Clinical Health (HITECH) Act place the healthcare system as a national priority (Burke, Stewart, & Cartwright-Smith, 2010). The HITECH Act provides a legal and financial framework for implementing health information technology (HIT) and promoting meaningful use (Burke et al., 2010). Meaningful use involves “using electronic health records (EHR) technology to improve quality, safety, efficiency and reduce health disparities; engage patients and family; improve care and coordination, and population and public health; and maintain privacy and security of patient health information” (Murphy, 2010, p. 284). The U.S. government allocated an estimated \$19 billion for hospitals and ambulatory settings to implement meaningful use with EHR (Murphy, 2010).

Adopting the EHR has implications for the social change landscape within the healthcare industry. Implementation of an EHR is currently a priority for the U.S. healthcare system (Song et al., 2011). Electronic health records have the capability to address population and public health information needs and contribute to government health policies and financing (Friedman, Parrish, & Ross, 2013). An EHR can be routinely used to improve communication, quality of care, reduce medical errors, and eliminate waste (Song et al., 2011).

Despite the advantages of the EHR, nurses have been reluctant to embrace the technology. A recent survey conducted by Positioning Nursing in a Digital World (2014)

found that a third of nurses have not received training on an information technology system (as cited in Wright, 2014, p. 64). This lack of training affects attitudes and fosters resistance to adopting an EHR (Wright, 2014). To avoid resistance and failure to adopt, it has been suggested that simulated training on an EHR system can assist nurses in feeling less overwhelmed and more confident with technology (Haugen, 2012). This project was conducted to address the use of simulated training to foster acceptance of the EHR and was guided by the framework of Rogers's diffusion of innovation (DOI). This project was necessary as it related to the realization among nurses that possessing computer skills is critical to their practice due to the rapid expansion of technology throughout society (Peace, 2011). In order to practice effectively, nurses must possess basic computer skills and have basic information literacy (Peace, 2011). Training nurses on an EHR system in a simulated environment promotes their confidence in skills they need to grow and addresses the fear of mistakes and failure associated with the use of technology (Wright, 2014). These skills are now a necessity for the practice of nursing and allow nurses to be part of the social change occurring in healthcare.

Background

The idea of improving patient care is not new and the goal of representing information in a managed form has been pursued for centuries. In the 17th century, Wilhelm Von Leibnitz searched for a method to code human behavior in order to represent the information in a managed form (Cesnik, 2010). World War II was the catalyst for the development of electronic computers. The computer was large and bulky, occupying an entire room, and ran on valves that utilized great amounts of power

(Cesnik, 2010). However, it was a beginning, and from that point, computers rapidly evolved to become a powerful tools in assisting the business world including hospital systems, health related areas, and providers (Cesnik, 2010).

In the 1970s, professional and scholarly journals began to publish reports of computer applications in nursing (Ozbolt & Saba, 2008). Systems were developed for nursing care planning to assist in improving the completeness and quality of charting. These were the early precursors of current protocols and pathways that are now built on evidence-based practice (Ozbolt & Saba, 2008). The 1980s and 1990s saw progress in the increasing number of healthcare professionals who recognized the benefits and necessity of standardizing data to support nursing practice and to create new knowledge (Ozbolt & Saba, 2008).

A startling report issued by the Institute of Medicine (IOM), *Crossing the Quality Chasm: A New Health System for the 21st Century* (2001) propelled public and private efforts to fully merge healthcare with technology (Ozbolt & Saba, 2008). In 2004, President George W. Bush signed into law Executive Order 13335, which urges every American to have an accessible health record by 2014 (Ozbolt & Saba, 2008; Wimberley, 2010). In 2009, President Barack Obama authorized the \$800 billion stimulus package ARRA (Wimberley, 2010). Along with HITECH, ARRA aims to enhance the standard of health care and create a national electronic health record exchange (Wimberley, 2010).

In 2011, Medicare and Medicaid launched the EHR incentive program. This incentive will be available through 2016 and is intended to offset the initial start-up cost of an EHR. Providers (i.e., hospitals and ambulatory clinics) must show meaningful use

by 2015 (McBride, Delaney, & Tietze, 2012). This will happen in stages with Stage 1 consisting of data capture and sharing, including computerized providers order entry (CPOE; McBride et al., 2012).

Healthcare in the United States has not kept pace with technology and has operated in “silos” (IOM, 2001). The ARRA and HITECH Acts have brought sweeping changes to healthcare systems and nurses need knowledge and skills to navigate the changes (Dowding, 2013). Research has shown inadequate computer skills to be a key factor in nurses’ inability to take advantage of HIT (Furst et al., 2013; Nkosi et al., 2011). To empower nurses to achieve the benefit of EHR, an environment supportive of learning technology is recommended (Furst et al., 2013; Nkosi et al., 2011). Simulation is an excellent bridge for nurses who lack computer skills to successfully use HIT including EHR (Abe, Kawahara, Yamashina, & Tsuboi, 2013). Simulated activities increase confidence, improve technical skills and promote teamwork and communication (Abe et al., 2013). Outside of healthcare, consumers are integrating technology into their everyday lives and this technology is infusing new solutions into the clinical environment (Sensmeier, 2011). Nurses who can integrate this technology into practice will be crucial to healthcare and as valuable as the technology itself (Sensmeier, 2011).

Problem Statement

An identified problem with the adoption of EHR was a lack of basic computer skills in nurses who have no background in information technology. Up to 45% of current nurses were in the workforce before the proliferation of technology (Furst et al., 2013). Therefore, a lack of training and/or preparation with computer skills hinder the

adoption of technology and lead to cognitive and attitudinal barriers (Courtney, Demiris, & Alexander, 2005; Furst et al., 2013). This can have a significant impact on workflow. Nurses are responsible for integrating multiple sources of information along with coordination of resources in their daily management of patient care (Courtney et al., 2005; Furst et al., 2013). The addition of HIT to the existing workload without adequate training affects productivity and the adoption of the technology (Courtney et al., 2005; Furst et al., 2013).

Health information technology has the capability to decrease errors, waste and cost in healthcare (Bredfeldt, Awad, Joseph, & Snyder, 2013; Courtney et al., 2005; Nkosi, Asah, & Pillay, 2011). Health information technology's contribution to addressing the growing crisis in healthcare includes reducing the number of medication errors, promoting efficiency in time management, monitoring adherence to treatment plan, reducing inpatient days, and tracking trends (Zhang et al., 2013).

However, to reach this potential, healthcare providers must be willing and able to use the technology (Bredfeldt et al., 2013; Courtney et al., 2005; de Veer & Francke, 2010; Lu, Hsiao, & Chen, 2012; Nkosi et al., 2011). Moving from a paper-based milieu to HIT is often a disruptive process that requires training on multiple levels (Rothman, Leonard, & Vigoda, 2012). Many current healthcare professionals received their educational training before the information technology explosion and lack basic computer skills to successfully navigate an EHR (Bredfeldt et al., 2013; Furst et al., 2013). Due to the lack of computer skills, multiple training sessions are necessary to overcome the new

users' initial feeling of being overwhelmed (Bredfeldt et al., 2013; Courtney et al., 2005; de Veer & Francke, 2010; Lu et al., 2012; Nkosi et al., 2011).

Literature reveals that adoption barriers to information technology (IT) center on situational, cognitive, or physical, legal and/or attitudinal barriers (Courtney et al., 2005). The degree to which the technology is perceived to be of benefit is recognized as relative advantage, which is the first characteristic of innovation in the DOI process (Rogers, 2003). The acceptance of new technology can depend on the interaction and social dynamics of coworkers and the culture of the organization (Courtney et al., 2005; De Veer & Francke, 2010; Lu et al., 2012). The relevance of the influence of peers and the organization toward the adoption of IT cannot be overlooked or underestimated. Nurses more readily accept new technology if it is perceived to be a fit with nursing practice, improves patient outcomes, and decreases the workload of the nurse (Courtney et al., 2005; De Veer & Francke, 2010; Lu et al., 2012). Nurses are the largest discipline in healthcare and present with unique information needs. The acceptance of HIT is dependent on training, workplace culture, and the perceived benefit of the technology (Courtney et al., 2005). Therefore, it is crucial to obtain a nursing perspective when implementing an IT system in order to promote the acceptance and integration of the system (Carayon et al., 2011; Courtney et al., 2005; De Veer & Francke, 2010; Lu et al., 2012; Nkosi et al., 2011).

Project Question, Purpose and Objectives

The project question was does simulated training on a generic EHR system improve the knowledge, skill, and attitude of nurses with little or no experience with

EHR? The purpose of this project was to evaluate the effectiveness of simulated training with a generic EHR to improve the knowledge, skill, and attitude of nurses with little or no training on an EHR. This project was conducted to measure (a) nurses' knowledge, skill, and attitude toward EHR; (b) nurses' level of comfort in using the EHR; and (c) nurses' level of satisfaction with training on EHR (Culley et al., 2012; Nkosi et al., 2011).

To address the problem of HIT adoption, this project was implemented to reduce the impact of lack of training on EHR through the use of simulation. Research found that nurses with previous exposure and basic training on computers were more confident and less resistant to adopting HIT (Goldsack & Robinson, 2014; Gregory & Buckner, 2014; Nkosi et al., 2011). Simulated activities on a generic EHR offered the opportunity to practice learning computer and charting skills in a safe, nonthreatening environment that allowed the learners to feel more secure in their ability to succeed (Guise, Chambers, & Välimäki, 2011; Haugen, 2012).

Guiding Theory

The conceptual framework of Roger's Diffusion of Innovation (DOI) guided these activities. The speed of adoption will depend on relative advantage, compatibility, complexity, trialability, and observability (Berwick, 2003; Pender et al., 2011; Rogers, 2003). Innovations that are perceived as having these 5 characteristics have the most influence over the rate of adoption (Rogers, 2003). The project started with presenting the relative advantage and compatibility of the EHR. Rogers (2003) found that relative advantage to be a crucial component and the first step necessary in the adoption of an innovation. Providing hands-on training on an EHR in a safe environment alleviated

anxiety, promoted a positive attitude toward the potential use of the EHR, and increased self-efficacy (Cato & Abbott, 2006; Courtney et al., 2005; de Veer & Francke, 2010; Lu et al., 2012). Once the nurse recognizes the advantage, compatibility to the workflow can more readily be developed (Rogers, 2003).

Methods

This study used a quantitative approach and the design was a pretest-posttest survey. The sample was a convenience sampling and was composed of licensed practical nurses (LPNs) and registered nurses (RNs) with little or no experience with EHR. The participants worked in a non-clinical-based facility (i.e. long-term care or home health care agency) were over the age of 18, were able to read and speak English, and were either male or female.

The instrument used was the Pretest for Attitudes Toward Computers in Healthcare (P.A.T.C.H.) assessment scale v. 3 (2011, Kaminski, 2013).). The P.A.T.C.H. assessment scale tool v. 1 (1996) and v. 2 (2007) have been used worldwide in various settings, and validity and reliability are well established (Kaminski, 2013). The P.A.T.C.H. assessment scale v. 3 (2011) was designed to assess a nurse's attitudes toward computers in healthcare. The P.A.T.C.H. assessment scale v. 3 (2011) tool had 50 questions that were ranked using a 5-point Likert scale: 1–*strongly agree*, 2–*agree*, 3–*not certain*, 4–*disagree*, and 5–*disagree strongly*. The results were tallied according to the scoring tool for the survey with a scale of 0-100. Permission to use the P.A.T.C.H. assessment scale v.3 (2011) was received from the author.

The training was conducted in the simulation lab of the local community college as per partnership agreement with non-hospital-based clinical settings for training purposes. Walden University's Internal Review Board (IRB) approval was obtained before implementing the project. After the pretest survey, training on a generic simulated EHR system was introduced utilizing a variety of scenarios and tasks. Afterward the same survey was administered as the post survey.

Findings and Discussion

Findings With Evidence Support

There is limited research on how the theory of DOI interacts with nurse's acceptance of EHR (Hsu et al., 2013; Lee, 2004; Menachemi, 2006). This project contributes to the existing literature by comparing the effects of a simulated intervention with an EHR guided by the DOI model.

There were 13 participants in this study-11 licensed practical nurses (LPNs) and two registered nurses (RNs), nine women and three men. Each nurse completed a pretest and posttest survey, which was scored according to the assigned P.A.T.C.H. assessment scale v. 3 scoring tool against the selected numbers on the Likert scale. The overall survey results are compared in Table 1. Each posttest survey yielded a positive increase in the score (with increases ranging from 0.5 to 5 points), with an average pretest score of 54.23 and an average posttest score of 57.42 on a scale of 0-100.

Each score was compared to a category as assigned by the P.A.T.C.H. assessment scale v. 3 score interpretations (see Appendix E): Category 1 = 0–17 points; Category 2 = 18–34 points; Category 3 = 35–52 points; Category 4 = 53–69 points; Category 5 = 70-86

points; and Category 6 = 87–100 points (Kaminski, 2013). Surveys 5, 7, and 10 began and increased in Category 3 (23%; $n = 3$), which reflected “moderate comfort in using computers, has basic knowledge of computers and applications, limited awareness of applications of computer technology in healthcare” (Kaminski, 2013). Surveys 1, 2, 3, 4, 6, 8, 9, 11, 12, and 13 began and increased in Category 4 (77%; $n = 10$), which reflected “feels comfortable using user-friendly computer applications, aware of the usefulness of computers in a variety of settings, has a realistic view of current computer capabilities in healthcare” (Kaminski, 2013).

Table 1

Overall P.A.T.C.H. Survey Results

Survey number	Pre-survey score	Post-survey score	Point difference
1	54	58.5	4.5
2	59	64	5
3	67.5	68	0.5
4	63.5	65.5	2
5	42	45	3
6	64	67.5	3.5
7	44.5	49.5	5
8	53.5	57	3.5
9	54	55.5	1.5
10	36.5	40.5	4
11	54.5	58.5	4
12	58	61	3
13	54	56	2

Findings With Framework Support

This project was conducted to demonstrate how DOI’s innovation-decision process could facilitate adoption of EHR among nurses with little to no experience with EHR. The characteristics of innovation-relative advantage, compatibility, complexity,

trialability, and observability-have had the greatest impact on the speed of adoption (Rogers, 2003).

To illustrate how the DOI model can guide the adoption of the EHR, the survey questions were assigned to the five characteristics of innovation-relative advantage, compatibility, complexity, trialability, and observability-based on their definition and the content of the question (see Appendix F). Once the survey questions were divided into the five characteristics, the scores for each question were tallied for each survey to achieve a pretest and posttest score to assess the influence of each step. The results are provided in Table 2.

Table 2

P.A.T.C.H. Survey fit with Diffusion of Innovation

Diffusion of innovation concept	P.A.T.C.H. Survey questions	Pre-survey score	Post-survey score	Point difference
Relative advantage	1, 2, 11, 15, 19, 20, 21, 35, 48, 49	145.5	154	8.5
Compatibility	5, 7, 9, 10, 16, 23, 25, 26, 28, 32, 38, 39, 40	188	199.5	11.5
Complexity	3, 4, 6, 13, 14, 17, 18, 22, 29, 30, 31	129.5	137	7.5
Trialability	8, 12, 27, 34, 36, 43, 45, 46	120	127	7
Observability	24, 33, 37, 41, 42, 44, 47, 50	121.5	128	6.5

Relative advantage was the second largest gain in points, with an overall 8.5-point increase from pretest to posttest. *Relative advantage* is “the degree to which an innovation is perceived as better than the idea it supersedes” (Rogers, 2003, p. 229). Some diffusion scholars have discovered that a strong predictor of adoption is relative advantage (Rogers, 2003). Factors involved in relative advantage can include savings of time, effort, and money along with immediate results that can lead to a reduction in uncertainty (Hsu et al., 2013; Lee, 2013; Rogers, 2003). Nurses must recognize the relative advantage of using IT. Computer competencies in healthcare are now essential for nurses (Kaya, 2011).

Compatibility had the largest gain in points, with an overall 11.5-point increase from pretest to posttest. *Compatibility* is “the degree to which an innovation is perceived as being consistent with existing values, past experiences and needs of potential adopters” (Rogers, 2003, p. 241). Compatibility is closely associated with sociocultural value, beliefs, and attitudes (Rogers, 2003). Research has shown that nurses’ attitude is critical to the effective acceptance of an IT system (Furst et al., 2013; Hsu et al., 2013; Kaya, 2011; Lynch et al., 2014; Murphy, 2010; Nkosi et al., 2011). Compatibility that works with individual skill and style has been associated with significant satisfaction and continued use (Hsu et al., 2013).

Complexity was the third largest gain in points with an overall 7.5-point increase from pretest to posttest. *Complexity* is “the degree to which an innovation is perceived as difficult to understand and to use” (Rogers, 2003, p. 257). Simple innovations are adopted faster and spread more quickly (Berwick, 2003; Lu et al., 2012; Hsu et al., 2013;

Lee, 2004; Rogers, 2003). An IT system is more readily adopted if the system is user-friendly and the user has had some previous exposure to computers (Carayon et al., 2011; Kaya, 2011; Ketikidis et al., 2012; Lu et al., 2012; McBride et al., 2012).

Trialability was the fourth largest gain in points with an overall 7-point increase from pre-test to post-test. *Trialability* is “the degree to which an innovation may be experimented with on a limited basis” (Rogers, 2003, p. 258). Simulation scenarios with an EHR provide a “hands-on” type environment where the nurse can experiment with the system without fear of failure or harm (Abe et al., 2013; Handley & Dodge, 2013; Haugen, 2012).

The final category of observability had the lowest in gain in points with an overall 6.5-point increase from pretest to posttest. *Observability* is “the degree to which the results of an innovation are visible to others” (Rogers, 2003, p. 258). This area can be critical because nursing relies the success or failure of an intervention in order to make adjustments to the plan of care (Carayon et al, 2011; Lee, 2004). Therefore, the ability to observe the result becomes a factor in the successful adoption of an innovation (Carayon et al., 2011; Lee, 2004; Rogers, 2003). It is important that nurses be able to identify that they make a difference using IT and engaging in meaningful use (McBride et al., 2012).

Recommendation for Practice

An improvement was noted in participating nurses’ level of attitude, comfort, and satisfaction with EHR as indicated by the increase in all areas of the P.A.T.C.H. assessment scale v. 3. The use of simulation for EHR offers a learning environment that can bridge different levels of learning, upgrade skill levels and improve communication

and teamwork (Abe et al., 2013; Handley & Dodge, 2013; Haugen, 2012). Nurses represent the largest group in the healthcare field (Courtney et al., 2005; Lee, 2004; Lu et al., 2012). Therefore, nurses will become the largest group of technology users (Lee, 2004; Lu et al., 2012).

The results of this project are consistent with the literature and current research and illustrate the importance of addressing the need for interactive training. Nurses will more readily adopt and accept technology if it is perceived to have relative advantage (be better than the current system); compatibility (fit with nursing practice and how the nurse can deliver care); limited complexity (be user friendly); trialability (be able to be used in a nonthreatening area); and observability (demonstrate the benefit to the patient and nurse: Courtney et al., 2005; de Veer & Francke, 2010; Lu et al., 2012; Rogers, 2003).

The HITECH Act is now encouraging the adoption of an IT system and not knowing an EHR system is no longer supported. Possession of computer skills and competency is now essential for nurses (Kaya, 2011). Current research on nursing attitudes toward computer skills reveals that higher education is associated with a positive outlook toward technology (Kaya, 2011). For the nurses who have been in the profession since before the advent of current technology, education is the key to success. Nurses are responsible for integrating multiple elements of information and coordinating the services of care providers. The use of HIT can help enhance the efforts of the nurse and improve the efficiency of care (Courtney et al., 2005). To this end, effective and supportive training must be provided to facilitate understanding and acceptance of HIT (Courtney et al., 2005; Kaya, 2011). Simulation training is based in adult learning principles and the

need for adding experiences to one's existing framework of knowledge (Guise et al., 2012). Simulations can address the crucial step of complexity and observability by training on usability, increasing skill, improving attitude, and providing immediate feedback (Guise et al., 2012). This project contributed to social change in practice by enhancing the awareness of EHR in nurses who are new users of IT. Further research is needed on the effectiveness and feasibility of simulation and EHR training, which can lead to larger social change and greater adoption of technology in healthcare.

Project Strength and Limitations

One of the strengths of this project was the willingness of nurses to participate in a 1 day only simulation training session on EHR. Another strength of the project was in its simplicity. The simulated EHR system was user friendly and easily taught while presenting strong scenario for charting. The time frame was short and the information was not overwhelming in nature. Limitations included: 1) the event was held for 1 day only; 2) using a convenience sampling of volunteers willing to participate; 3) only 13 participants attended. The relatively small scope of this project limits generalization of the results to an individual level and are not to be applied to the larger population. Due to this limitation, the results cannot be stated to contribute to actual knowledge or skill but can contribute to awareness of charting on an EHR.

Recommendation for future projects would include allowing for an extension of timeframe in order to maximize the number of volunteers and to enhance generalizability of the results. Multiple training sessions should be offered to accommodate the learning levels of the nurse. Nursing does have different needs from other healthcare providers

due to the complex nature of their role in healthcare. The ability to learn how to use an HIT system is crucial. The value of accepting technology cannot be underestimated (Courtney et al., 2005; Kaya, 2011).

Future projects could also include involving a collaborative agreement between healthcare employers and community colleges/universities to provide training on a simulated EHR for nurses who need this training. The community leaders should take a lead role in this initiative and transform delivery of care at the local level. This collaboration will strength the community and facilitates adoption and acceptance of HIT in nursing.

Summary

Simulation has advanced from a learning tool to a complex system that allows authentic interaction in delivery of context in a safe, nonthreatening environment (Guise et al., 2012; Handley & Dodge, 2013). Using simulation to train nurses on an EHR system allows the nurse to practice and repeat steps as needed to accommodate learning styles thus enhancing confidence and efficiency (Guise et al., 2012; Handley & Dodge, 2013). This project illustrated the positive effects of enhanced awareness on nurses who have little to no training on an EHR system and the potential success if such a program were in place. Employers and community colleges and/or universities would benefit from a mutual collaborative agreement in utilizing combined resources to promote the welfare of the community. Technology has had a wide-ranging impact on the nursing profession and nurses must now adapt to the new trend (Furst et al., 2013). Nurses across the United States will need to develop the skill set necessary to function in the

increasingly technological environment in order to provide effective care (Furst et al., 2013; Halley et al., 2009). Once nurses acquire the skills to work with IT, the ability to influence systems that deliver safe effective patient care will be invaluable (Furst et al., 2013; Halley et al., 2009).

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Appendix A: P.A.T.C.H Assessment Scale v. 3 Survey

P.A.T.C.H. Assessment Scale and Personal Plan © June Kaminski 1996 - 2013

P.A.T.C.H. Assessment Scale v.3 □**Pretest for Attitudes Toward Computers in Healthcare**

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Directions:

Each indicator is to be rated using a five point Likert scale.

Choose the response that best reflects your attitude for each statement.

SCALE:

1. Agree Strongly	2. Agree	3. Not certain	4. Disagree	5. Disagree Strongly
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- | | | | | | |
|--|---|---|---|---|---|
| 1. The computer is a powerful enabling tool. | 1 | 2 | 3 | 4 | 5 |
| 2. In healthcare, computers could save a lot of paperwork. | 1 | 2 | 3 | 4 | 5 |
| 3. Machines and I don't mix. | 1 | 2 | 3 | 4 | 5 |
| 4. I feel I am a skilled typist. | 1 | 2 | 3 | 4 | 5 |
| 5. I feel alarmed when I think of using a computer. | 1 | 2 | 3 | 4 | 5 |
| 6. I have excellent finger dexterity. | 1 | 2 | 3 | 4 | 5 |
| 7. I regularly use a computer at home. | 1 | 2 | 3 | 4 | 5 |
| 8. I would love to be a proficient user of computers. | 1 | 2 | 3 | 4 | 5 |
| 9. Bedside computers will irritate patients. | 1 | 2 | 3 | 4 | 5 |
| 10. I will never feel relaxed about using a computer. | 1 | 2 | 3 | 4 | 5 |
| 11. Computers can help me to be creative. | 1 | 2 | 3 | 4 | 5 |

SCALE:

1. Agree Strongly	2. Agree	3. Not certain	4. Disagree	5. Disagree Strongly
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12. I would enjoy learning course work using a computer program. 1 2 3 4 5
13. Computers are frustrating to use. 1 2 3 4 5
14. Listening to people using computer jargon intimidates me. 1 2 3 4 5
15. Computers will someday put health professionals out of a job. 1 2 3 4 5
16. I am in control when I use a computer. 1 2 3 4 5
17. I relate well to technology and machines. 1 2 3 4 5
18. I feel confident that I can master using a computer. 1 2 3 4 5
19. I can let my creativity flow when writing using a computer. 1 2 3 4 5
20. Computers in healthcare will create more work for nurses. 1 2 3 4 5
21. Computers can be great problem-solving tools. 1 2 3 4 5
22. Computers are too complicated for me to learn well. 1 2 3 4 5
23. Computers are impersonal and dehumanizing. 1 2 3 4 5
24. The future promise of computers in healthcare excites me. 1 2 3 4 5
25. I feel restless and confused when I think of using a computer. 1 2 3 4 5
26. I don't intend to own a home computer. 1 2 3 4 5
27. I feel a computer course in nursing is totally unnecessary. 1 2 3 4 5

SCALE:

1. Agree Strongly	2. Agree	3. Not certain	4. Disagree	5. Disagree Strongly
-------------------	----------	----------------	-------------	----------------------

28. People who like computers are introverted and antisocial. 1 2 3 4 5
29. I know more about computers than most faculty or administrators do. 1 2 3 4 5
30. Working with computers is boring and tedious. 1 2 3 4 5
31. I can easily master the content of a computer lesson. 1 2 3 4 5
32. I feel ambivalent about computers and technology. 1 2 3 4 5
33. Computers are everywhere, it is natural for them to used in healthcare. 1 2 3 4 5
34. I like to use the Internet to research health and nursing information. 1 2 3 4 5
35. It takes longer to chart on the computer than on paper. 1 2 3 4 5
36. I enjoy using technology to communicate with colleagues (email, etc.)□ 1 2 3 4 5
37. Computers help me to keep up to date with nursing issues, knowledge, research. 1 2 3 4 5
38. Computers are just another object that takes me away from my patients. 1 2 3 4 5
39. I resent the thought of having to use computers in my nursing practice. 1 2 3 4 5

SCALE:

1. Agree Strongly	2. Agree	3. Not certain	4. Disagree	5. Disagree Strongly
-------------------	----------	----------------	-------------	----------------------

40. Using technology in practice interferes with my ability to be caring to my patients. 1 2 3 4 5
41. Patients should not look for health and illness information on the Internet 1 2 3 4 5
42. Social media tools enrich health care professional communication and collaboration. 1 2 3 4 5
43. I use health care apps on my cellphone or SMART phone. 1 2 3 4 5
44. Nursing related online groups, forums, and email discussion lists are a waste of time. 1 2 3 4 5
45. Electronic charting restricts how nurses record patient care. 1 2 3 4 5
46. Personalized Electronic Health Records streamline access to information and interdisciplinary communication about patients. 1 2 3 4 5
47. Online support groups are a waste of time and have no value for patients. 1 2 3 4 5
48. Computers are great tools for patient education. 1 2 3 4 5
49. Hand written charting is much more complete than electronic documentation. 1 2 3 4 5
50. Nurses should be involved in the planning of national Electronic Health Records. 1 2 3 4 5

Appendix B: P.A.T.C.H. Assessment Scale v. 3 Public Use Page

P.A.T.C.H. Assessment Scale v. 3
 Pretest for Attitudes Toward Computers in Healthcare
 © June Kaminski 1996 - 2013

I created the first version of the P.A.T.C.H. (Pretest for Attitudes Toward Computers in Healthcare) in 1996 to help my students explore their feelings about learning to use computers both in education and healthcare. Further revisions occurred in 2007, which culminated in the second version. The third version debuted in 2011 to include statements related to social media, ehealth, electronic health records, and mobile technology. It also streamlined the scoring process. This scale focuses on attitudes and feelings about using computers in the practice setting. You may download a pdf copy to print and complete by hand in the Competencies Plan section below.

Or, you can click on the following image to securely complete and score the assessment scale online. You will need to create an account in the course area to access the online scale. If you are from an educational institution, please ensure that the site is approved by your server so you receive your confirmation email when you sign up.



Application:

Over the years, the P.A.T.C.H. Scale has been used quite consistently by various educators from around the globe (i.e. USA, Canada, Philippines, Jamaica, China, and Turkey) to test their Nursing degree student's attitudes towards computers in health care. Nurse administrators and clinicians have used it with various groups of nurses working in hospitals, community health centers, schools, and home health. It has also been used in several graduate students' thesis and dissertation work and by other nurse researchers. Some published highlights are listed below.

Turkish Study (2008) □□Kaya, N. Turkinaz, A. (February 2008). Validity and Reliability of Turkish version of the Pretest for Attitudes towards Computers in Healthcare Assessment Scale. *Journal of Istanbul University Florence Nightingale*

School of Nursing, 16(61), 24 - 32.

ABSTRACT:

Objective: The purpose of this methodological study was to assess the validity and reliability of Turkish version of the Pretest for Attitudes toward Computers in Healthcare Assessment Scale.

Method: The adaptation of the scale to Turkish language was performed via back-translation, content validity was examined by refer to experts, reliability was examined with test-retest reliability and internal consistency, validity was examined with criterion-related validity (concurrent validity). The universe of the study consisted of nurses who accept to participation of study at one state hospital and one university hospital. Test-retest reliability was examined with 60 nurses; internal consistency and concurrent validity were examined with 200 nurses.

Findings: The test-retest reliability of items of Pretest for Attitudes toward Computers in Healthcare Assessment Scale was 0.20-0.77, for the total scale was 0.85. For internal consistency, Scale's item total correlation was 0.06-0.68 and Cronbach's Alpha was 0.92. Concurrent validity was examined with correlation between Attitudes toward Computers Scale and Pretest for Attitudes Toward Computers in Healthcare Assessment Scale scores and there was positively significant correlated ($r=0.66$, $p<0.01$).

Conclusions: The findings concern in the reliability and validity of the Turkish version of the Pretest for Attitudes toward Computers in Healthcare Assessment Scale indicates that this instrument can be used in the studies that will be conducted in Turkey.

Turkish Study (2010) □□Kaya, N. (2010). Factors Affecting Nurses' Attitudes Toward Computers in Healthcare. *CIN: Computers, Informatics, Nursing*. Pre Production stage. doi: 10.1097/NCN.0b013e3181f9dd0f□□

ABSTRACT: The purpose of the study was to determine factors affecting nurses' attitudes toward computers in healthcare. This cross-sectional study was carried out with nurses employed at one state and one university hospital. The sample of the study included 890 nurses who were selected via a purposive sampling method. Data were collected by using a questionnaire for demographic information and Pretest for Attitudes Toward Computers in Healthcare Assessment Scale v.2. The nurses, in general, had positive attitudes toward computers. Findings of the present study showed a significant difference in attitudes for different categories of age ($P < .001$), marital status ($P < .05$), education ($P < .001$), type of facility ($P < .01$), job HD ($P < .001$), computer science education ($P < .01$), computer experience ($P < .001$), duration of computer use ($P < .001$), and place of use of computer ($P < .001$). The results of the present study could be used during planning and implementation of computer training programs for nurses in Turkey and could be utilized in improving the participation of Turkish nurses in initiatives to develop hospital information systems and,

above all, in developing computerized patient care planning.

Competencies Plan

As a nurse interested in Nursing Informatics skills, you have a unique set of related strengths, knowledge and learning needs. An initial learning plan is offered here to help you to begin to plan your personal development in computer literacy, information literacy and informatics theory and practice. Once you have identified your preliminary learning needs, you can plan strategies for equipping yourself with the theory and hands-on skills you need to be proficient in the various aspects of informatics. □□ This plan is available in PDF so you can download a copy, print and write in your responses right into it. Be sure to save a copy for your personal records! □

Download Your □ Personal Plan & Printable □ P.A.T.C.H.

Scale Here!

If you do not have
Adobe Reader on your computer,
download a copy
Here!

<http://nursing-informatics.com/niassess/plan.html>

Appendix C: P.A.T.C.H. Assessment Scale v. 3 Permission To Use

Walden University Mail - Re: Nursing Informatics Learning Center ... <https://mail.google.com/mail/u/0/?ui=2&ik=8fe9417031&view=pt&...>



Sharon Adams <sharon.adams2@waldenu.edu>

Re: Nursing Informatics Learning Center Contact

2 messages

June Kaminski <june@nursing-informatics.com>
 Reply-To: June Kaminski <june@nursing-informatics.com>
 To: sharon.adams2@waldenu.edu

Wed, Feb 25, 2015 at 9:01 PM

Hello Sharon,

You have my permission to use the PATCH tool. I would love to see your results once done.

Thanks for your interest,
 June

June Kaminski RN MSN PhD(c)
 Past President, Director, Research Chair
 Xi Eta Chapter, Sigma Theta Tau International
 Nursing Informatics.com
<http://www.nursing-informatics.com>
 Editor in Chief
 Canadian Journal of Nursing Informatics
<http://cjni.net>
 Editor in Chief
 Online Journal of Nursing Informatics
<http://www.himss.org/ojni>

-----Original Message----- From: nurs1678@hp99.hostpapa.com
 Sent: Friday, January 02, 2015 5:23 PM
 To: june@nursing-informatics.com
 Subject: Nursing Informatics Learning Center Contact

What is your name? Sharon Adams
 What is your email? sharon.adams2@waldenu.edu
 What are your comments? Dr. Kaminski,
 I am anDNP student who is researching nursing attitude regarding the new healthcare law and charting on an EHR system. I am seeking your approval to use your P.A.T.C.H. assessment scale v.3 to administer as a pretest/posttest survey. I am more than happy to send you any results I obtain. The IRB of Walden University requires that I contact you in writing and if you would please respond in writing I would greatly appreciate it. Please let me know if you need any more information from me.
 Sharon dams, MMSNEd, RN,DNP student
 Walden University

Sharon Adams <sharon.adams2@waldenu.edu>
 To: june@nursing-informatics.com

Thu, Feb 26, 2015 at 11:10 AM

Your message

2/26/2015 11:10 AM

Appendix D: P.A.T.C.H. Assessment Scale Version 3 Scoring Tool**P.A.T.C.H. Assessment Scale Version 3 Scoring Tool**

Record your final score for each of the statements as outlined below, then add your final scores for both columns for your final score out of 100. Then refer to the interpretations.

A. Rating Chosen	A. Score	B. Rating Chosen	B. Score
1	2	1	0
2	1.5	2	0.5
3	1	3	1
4	0.5	4	1.5
5	0	5	2
A. STATEMENT	A. YOUR SCORE	B. STATEMENT	B. YOUR SCORE
1		3	
2		5	
4		9	
6		10	
7		13	
8		14	
11		15	
12		20	
16		22	
17		23	
18		25	
19		26	
21		27	
24		28	
29		30	
31		32	
33		35	
34		38	
36		39	
37		40	
42		41	
43		44	
46		45	
48		47	
50		49	
TOTAL A:	TOTAL B:	FINAL= A _____ + B _____ = _____	

Appendix E: P.A.T.C.H. Assessment Scale v. 3 Score Interpretations

**P.A.T.C.H. Assessment Scale v 3
Score Interpretations**

Find the Range that contains the Score You Achieved on the P.A.T.C.H. Scale

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<http://nursing-informatics.com/niassess/index.html>

0 to 17 points	Positive indication of Cyberphobia. Beginner stage in experience with computer basics or applications. Ambivalence or anxiety may occur, related to the use of computers in healthcare. May appreciate help learning basic computer skills.
18 to 34 points	Indicates some uneasiness about using computers. Very basic knowledge of computer basics and applications. Unsure of usefulness of computers in healthcare.
35 to 52 points	Moderate comfort in using computers. Has basic knowledge of computers and applications. Limited awareness of applications of computer technology in healthcare.
53 to 69 points	Feels comfortable using user-friendly computer applications. Aware of the usefulness of computers in a variety of settings. Has a realistic view of current computer capabilities in healthcare.
70 to 86 points	Confident of ability to use a variety of computer programs. Sees computers as beneficial in the development of society. Enthusiastic view of the potential of computer use in healthcare.
87 to 100 points	Very confident that they can learn to use a computer to boost creativity, and perform routine functions. Recognizes the unique value of using information technology in society. Idealistic, positive view related to computer applications in healthcare.

Appendix F: P.A.T.C.H. Survey With Diffusion of Innovation

Diffusion of Innovation Concept	P.A.T.C.H. Survey Questions
Relative Advantage	1. The computer is a powerful enabling tool 2. In healthcare, computers could save a lot of paperwork 11. Computers can help me be creative 15. Computer will someday put health professionals out of a job 19. I can let my creativity flow when writing using a computer 20. Computers in healthcare will create more work for nurses 21. Computers can be great problem-solving tools. 35. It takes longer to chart on the computer than on paper 48. Computers are great tools for patient education 49. Hand written charting is much more complete than electronic documentation
Compatibility	5. I feel alarmed when I think of using a computer 7. I regularly use a computer at home 9. Bedside computers will irritate patients 10. I will never feel relaxed about using a computer 16. I am in control when I use a computer 23. Computers are impersonal and dehumanizing 25. I feel restless and confused when I think of using a computer 26. I don't intend to own a home computer 28. People who like computers are introverted and antisocial 32. I feel ambivalent about computers and technology 38. Computers are just another object that takes me away from my patients 39. I resent the thought of having to use computers in my nursing practice 40. Using technology in practice interferes with my ability to be caring to my patients
Complexity	3. Machines and I don't mix 4. I feel I am a skilled typist 6. I have excellent finger dexterity 13. Computers are frustrating to use 14. Listening to people use computer jargon intimidates me 17. I relate well to technology and machines 18. I feel confident that I can master using a computer 22. Computers are too complicated for me to learn well. 29. I know more about computers than most faculty or

	administrators do
	30. Working with computers is boring and tedious
Trialability	31. I can easily master the content of a computer lesson
	8. I would love to be a proficient user of computers
	12. I would enjoy learning course work using a computer
	27. I feel a computer course in nursing is totally unnecessary
	34. I like to use the Internet to research health and nursing information
	36. I enjoy using technology to communicate with colleagues (email, etc.)
	43. I use health care apps on my cellphone or SMART phone
	45. Electronic charting restricts how nurses record patient care
Observability	46. Personalized Electronic Health Records streamline access to information and interdisciplinary communication about patients
	24. The future promise of computers in healthcare excites me
	33. Computers are everywhere, it is natural for them to be used in healthcare
	37. Computers help me to keep up to date with nursing issues, knowledge, research
	41. Patients should not look for health and illness information on the Internet
	42. Social media tools enrich health care professional communication and collaboration
	44. Nursing related online groups, forums, and email discussion lists are a waste of time.
	47. Online support groups are a waste of time and have no value for patients
	50. Nurses should be involved in the planning of national Electronic Health Records
