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The Effect of Education on Portal Personal Health Record Use

Imke Casey DNP, CRNA, RHIT

Georgia College and State University, imke.casey@gmail.com

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The Effect of Education on Portal Personal Health Record Use

Imke Casey

Georgia College and State University

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Committee Chair: Jeanne Sewell, MSN, RN-BC

Georgia College School of Nursing Committee Member: Deborah MacMillan, PhD, CNM

Outside Committee Member: Rebecca Kitzmiller, PhD, MHR, RN-BC

Outside Committee Member: Sheila Fusé, B. A. Sc.

Date of Approval: 12/09/2015

THE EFFECT OF EDUCATION ON PHR USE

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Abstract

The purpose of this study was to assess the computer-use attitudes among chronically ill adult primary care practice (PCP) patients. The goal was to examine the rate of portal personal health record (PHR) use of middle-aged and older adults, to evaluate the effectiveness of an educational intervention in improving PHR adoption, and to identify patients' thoughts about the PHR. The quasi-experimental, pre-test/post-test design with a paired matched set was performed with a convenience sample of 50 subjects from a primary care group practice in Central Florida.

Participants were recruited on the day of their provider appointment. After participant's consent was obtained, the Background and Computer Questionnaire was administered and the educational intervention completed. A four-week follow-up phone survey followed the educational intervention.

To evaluate the effectiveness of the educational intervention, the participants were pair matched, a technique that uses knowledge of participants' characteristics such as age, gender, and ethnicity to form a comparison, or non-participant control group (Polit & Beck, 2012). Participants' computer use comfort level increased significantly four weeks after the PHR educational intervention ($Z = -1.668$, $p < .005$). In addition, the amount of PHR use by the participant group ($M = 1.08$) was significantly higher as compared to the pair matched control group ($M = 0.16$), $U = 735.5$, $p = .001$. Analysis of the qualitative component indicated that patients are willing to use the PHR if their laboratory results are up-to-date and available for review.

Hands-on computer instructions are an effective method to increase PHR use among chronically ill adult PCP patients. Computer training and education promote and improve the

overall computer use comfort level. Patients feel that the PHR is a valuable tool if their data are current and accessible.

Keywords: personal health record, patient portal, PHR adoption, computer education

The Effect of Education on Portal Personal Health Record Use

Chapter 1

Introduction

This chapter introduces the research problem and its significance as it relates to achieving better healthcare outcomes among chronically ill, middle-aged, and older primary care patients. The prevalence and impact of chronic disease (CD) is evaluated. Potential opportunities to engage chronically ill individuals in their own healthcare are reviewed. More specifically, the portal personal health record (PHR) is explored as a self-management tool for empowering individuals with chronic conditions and a means to improve their health. Current trends of PHR adoption are examined and the hypothesis that educational interventions may improve PHR use among the CD patient population is explored. Finally, the derived study aims of this translational research project are presented.

Personal health records, a technology that facilitates patient access to their medical record, may be a standalone program or a component of a healthcare provider's Electronic Health Record (EHR) system (Archer, Fevrier-Thomas, Lokker, McKibbin, & Straus, 2011). A personal health record portal is an online tool that allows people to access, view and manage their personal health information and facilitate self-management and care coordination via the Internet (Ricciardi, Mostashari, Murphy, Daniel, & Siminerio, 2013; Shade, Steward, Koester, Chakravarty, & Myers, 2015). In this study, the term portal Personal Health Record (PHR) refers to an Internet accessed patient health record linked to a provider EHR.

Integrating EHR data into PHRs allows patients to gain access to their health information. Additionally, providers meet a key requirement for patient engagement in the Meaningful Use Stage 2 criteria for EHR technology (Griskewicz, 2014). Meaningful Use is a Centers for

Medicare and Medicaid Services (CMS) incentive program that rewards eligible providers when specific EHR objectives are met (Office of the National Coordinator for Health Information Technology, n.d.)

Giving patients access to their health information and encouraging the use of PHRs can better position patients to self-manage their conditions, facilitate patient engagement, and improve patient-provider communication (Ricciardi, et al., 2013). Self-management is a unique approach wherein patients assume greater responsibility in their own healthcare (Baumann & Dang, 2012). The PHR represents an emerging opportunity to improve patients' access to health information and is viewed as an important step toward shared medical decision-making (Daniel, Deering, & Murphy, 2014).

PHRs may be of particular value to patients with chronic conditions (Tenforde, Jain, & Hickner, 2011). Adding medical resources, such as the PHR, may enhance chronic disease (CD) patient self-management and ultimately improve health outcomes. The World Health Organization (WHO) defines chronic disease as one that involves ongoing management over a period of years (World Health Organization, 2011). Treating a CD requires care coordination among a wide range of providers and access to medical records and monitoring systems (Nolte & Osborne, 2013).

Since evidence indicates that self-management may enhance quality of life (Centers for Disease Control and Prevention, 2014), CMS recommends quality metrics that require the provider to enhance self-management abilities for patients with CDs (Centers for Medicare & Medicaid Services, 2013). This study explores the current trend of PHR adoption by the chronically ill, including PHR benefits, and hypothesizes that educational interventions may improve PHR adoption within the selected patient population.

Problem Statement

Prevalence and Impact of Chronic Disease (CD)

The prevalence of CD has increased dramatically over the past twenty years, making it the number one cause of death in the United States (Centers for Disease Control and Prevention, 2014). The WHO (2011) also confirms that CDs are the leading cause of death and disability globally. In the United States, almost half of all adults are living with CD; 84% of all health spending is allocated to people with chronic conditions (Centers for Disease Control and Prevention, 2014). To reduce this dramatic development and impact to society, effective CD management and healthcare consumer engagement is essential (Sands & Wald, 2014). Research supports that individuals with chronic conditions have better health outcomes when able to self-manage and collaborate with their provider (Melchior et al., 2014; Nolte & Osborne, 2013).

The Role of Self-Management in Lessening CD Burden

In an attempt to lessen the CD burden on society and lower healthcare spending allocated to people with chronic conditions, researchers have focused on prevention and better management (Bauer, Briss, Goodman, & Bowman, 2014). One such focus is to empower patients to better manage their own care and become engaged and active participants when making healthcare decisions.

Research shows that patients exposed to paternalistic care, where the provider makes decisions for patients, often require more health care and incur higher healthcare costs (Robert Wood Johnson Foundation, 2014). In a paternalistic system, healthcare decision making is left to the provider; it is assumed that the clinician is the expert who knows best. Krist and Woolf (2011) found that the effect on the patient is detrimental; it is creating a dependency that is incongruent with modern healthcare.

Most healthcare consumers prefer a more patient-centered care model (Tenforde et al., 2011). Patients want to be in a partnership with their provider and want to make decisions about their health in an informed and collaborative manner (Krist & Woolf, 2011). Consequently, the patient-provider relationship should be based on mutual respect and shared decision-making. In a collaborative effort, the healthcare team would empower patients with self-management tools to encourage decisions that improve health related behaviors and clinical outcomes.

PHR as a Self-Management Tool for CD Patients

The PHR provides a secure online website that gives patients convenience 24-hour access to their health information from anywhere within an Internet connection (Office of the National Coordinator for Health Information Technology, 2015a). More importantly, patients have access to their health information during emergencies, while traveling, and on a continued basis to track their health over time (Office of the National Coordinator for Health Information Technology, 2015b). The PHR, when integrated in the delivery of care, allows patients to review their health information and communicate securely with their healthcare team; it allows patients and providers to directly communicate with each other using a secure messaging system. Recent studies indicate that health technology innovations, such as the PHR, empower patients to better manage their health results (Tenforde et al., 2011).

As the healthcare industry shifts into the digital age, patients now have the ability to more efficiently collaborate with their provider and actively engage in their own care with self-management tools such as the PHR. The PHR is an additional care delivery tool that helps individuals to reflect on their health and choose healthy behaviors (Higgins, Murphy, Worcester, & Daffey, 2012). The Registered Nurses' Association of Ontario (2010) recognized the

importance of the PHR as a self-management tool and developed evidence-based guidelines that recommend the promotion of PHR adoption as a strategy to support CD self-management.

Barriers to PHR Use

While PHRs have been available for more than ten years, they are used only by a fraction of United States healthcare consumers (Markle Foundation, 2011). Healthcare provider practices struggle to promote patient adoption; the reasons are unclear. Krist et al. (2014) found that even large scale advertising campaigns fail to increase the number of patients utilizing the PHR of healthcare organizations. It appears that just making a PHR available will not ensure successful use by patients.

Patients are more likely to use PHRs if their providers recommend PHR adoption and staff is available to explain PHR features (Kerns, Krist, Longo, Kuzel, & Woolf, 2013). It is recommended that primary care providers integrate PHR use into the plan of care to increase usage rates (Krist et al., 2014). Although it seems logical to take action to actively promote and facilitate PHR adoption, many providers do not have a structured program that improves PHR adoption (Butler et al., 2013).

Facilitators of PHR Use

Evidence-based clinical practice guidelines recommend strategies to support CD self-management including PHR adoption (Registered Nurses' Association of Ontario, 2010). The PHR allows patients to verify and reorder medication, to access and print the medical record, to review lab reports, to send secure messages, and to examine visit summaries.

The PHR can also be used for interactive monitoring and coaching. Krist et al. (2014) found that the PHR may engage patients to actively participate in their treatment plan and use information in the PHR to better self-manage their chronic condition. While recent trends

indicate that there is a growing interest in providing people with CDs with self-management tools, such as the PHR (Tenforde et al., 2011), the rate of adoption remains stagnant (Markle Foundation, 2011).

Innovative technologies such as the PHR allows patients to more efficiently communicate with their provider and actively engage and self-manage their own care; it is evident that the use of the PHR is an improvement over traditional patient care involvement. Accordingly, it seems only logical to inform and educate patients about PHR benefits and implement procedures to facilitate PHR use.

Purpose of the Study

This study examined the effect of an educational intervention on the adoption of PHR among chronically ill adult primary care practice (PCP) patients. This project used evidence-based research and clinical practice guidelines to evaluate a systematic process to actively promote and facilitate PHR use. Despite widespread interest in making patients' medical records available, little PHR research has been conducted. Additional PHR research may lead to knowledge that may reduce healthcare costs and improve the quality of health care.

Study Aims

This translational research study had the following four specific aims:

Specific aim I. Assess the computer-use attitudes among adult primary care patients (participants) who have a chronic condition in Lake County Florida before and after a PHR educational intervention.

Specific aim II. Examine the rate of PHR use by participants within a four week time period of an educational intervention.

Specific aim III. Evaluate the effectiveness of an educational intervention in improving PHR adoption among a group of adult primary care patients (participants) who have a chronic condition in comparison with a pair matched control group.

Specific aim IV. Identify individual participants' thoughts about the PHR.

Summary

The PHR provides healthcare consumers access to their health information and allows the secure exchange of information between a healthcare provider and a patient. The PHR empowers patients to actively participate in their own care leading to collaborative partnerships with their providers and improved healthcare outcomes. Informed healthcare consumers have a better understanding of their healthcare responsibilities and disease management. Consequently, there is a unique interest to explore the PHR as a self-management tool for chronically ill patients. I am interested to promote PHR use and hypothesized that an educational intervention may increase PHR use among the CD patient population. Based on this assumption and with the assistance of my research committee, I developed four research aims that identified the overall goals of this translational research project.

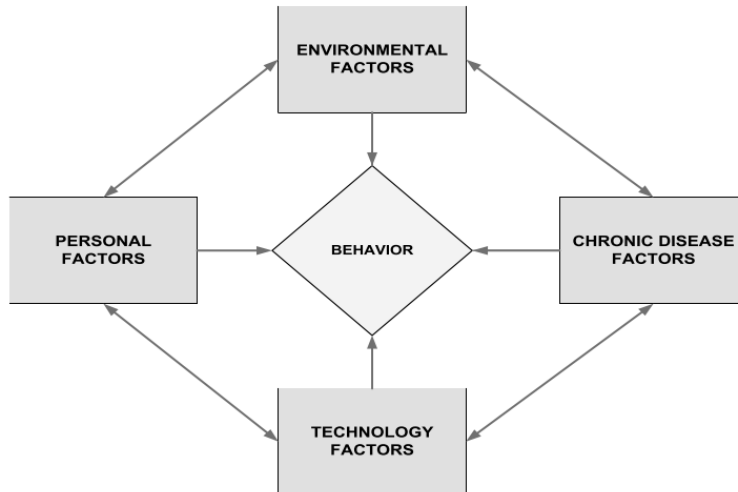
Chapter 2

Review of Literature

Using the portal personal health record (PHR) on a regular basis equates to PHR adoption. This chapter explores the current state of knowledge associated with PHR adoption and the unique needs of the chronically ill adult primary care patient as it relates to PHR use. Factors associated with PHR adoption are explained using the Logue and Effken (2012) Personal Health Record Adoption Model (PHRAM). Barriers to PHR adoption are identified and the overall benefits of PHR adoption are examined. The literature is then reviewed based on the identified concepts including chronic disease (CD) self-management, and patient engagement.

Theoretical Framework

Little was known about factors that influence PHR adoption until Logue and Effken (2012) developed PHRAM, a theoretical framework that explains the interaction between personal, technological, environmental, and CD factors (see Figure 1) and their influence on a person's behavior; it is the complex interaction between these factors that allows individuals to accept or decline the use of technology to improve their health. PHRAM draws concepts from several theories including (a) Social Cognitive Theory, (b) Integrated Model of Behavior Prediction, (c) Unified Theory of Acceptance and Use of Technology, and (d) Individual and Family Self-Management Theory (Logue & Effken, 2012). The theorists' "long-term goal is to use the explanatory model to develop and test interventions that will maximize the facilitators and minimize the barriers to PHR adoption" (Logue & Effken, 2012, p. 361). This study's aims are built on PHRAM's concepts.



*Figure 1 – PHRAM shows five interacting factors that affect the intention for PHR adoption, adapted from “Modeling Factors that Influence Personal Health Records Adoption” by M. D. Logue and J. A. Effken, 2012, *Computers, Informatics, Nursing*, (30)7, p. 359. Copyright 2012 by Wolters Kluwer Health. Reprinted with permission.*

Synthesis of Literature Review

Based on PHRAM’s factors associated with PHR adoption, a systematic literature review was performed. CINAHL Complete and PubMed were searched with the keywords PHR, patient portal, and chronic disease self- management. Of the 245 articles identified by the search, 50 were excluded based on title and abstract. One hundred ninety-five studies were screened and further reviewed based on the final inclusion criteria. A total of 49 articles were eligible for an in depth appraisal (see Figure 2).

The identified studies were grouped into five major topics based on the research aims and related measures. The topics identified include chronic disease and self-management, factors affecting PHR use to manage health, patient engagement, barriers of PHR adoption, and facilitators of PHR adoption.

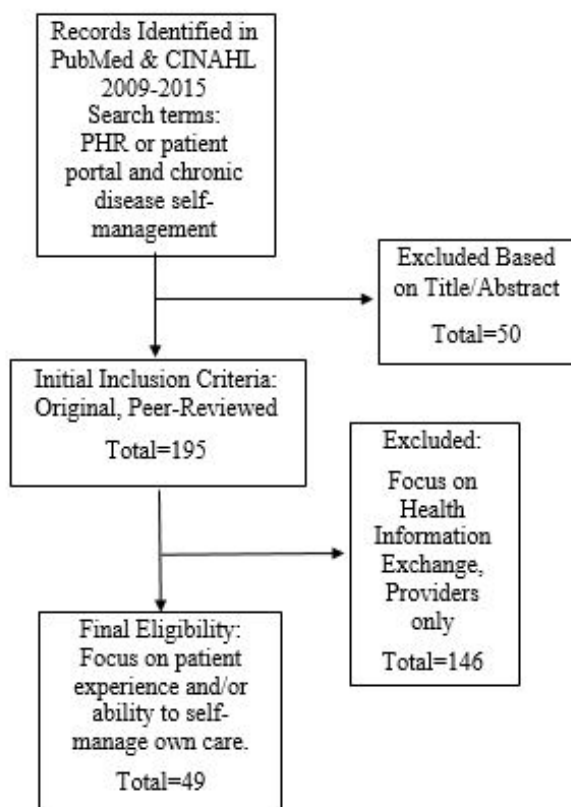


Figure 2 Flowchart for literature review

Chronic Disease (CD) and Self-Management

The World Health Organization defines chronic conditions as those that involve ongoing management over a period of years (World Health Organization, 2011). Managing a chronic illness is a time consuming and complex process. Treating CD requires care coordination among a wide range of providers and access to medications and monitoring systems (Nolte & Osborne, 2013). Studies indicate that self-management may enhance CD patients' quality of life (Bagnasco et al., 2014; Kerns et al., 2013).

Self-management is an individual's ability to manage the everyday effects of a chronic condition (Novak, Costantini, Schneider, & Beanlands, 2013); it involves a complex and diverse set of skills and activities that are influenced by knowledge and attitudes, such as confidence or

self-efficacy (Bagnasco et al., 2014). Individuals are tasked with applying these skills to set goals and to solve disease-related problems on a daily basis (Detaile, Heerkens, Engels, Gulden, & Dijk, 2013). Self-management support is the assistance given to someone with a chronic condition to encourage daily decisions that improve health-related behaviors and clinical outcomes. Self-management support includes techniques and tools including, but not limited to, the PHR that help an individual choose healthy behaviors (Higgins et al., 2012).

Bagnasco et al. (2014) completed a systemic review of descriptive and qualitative studies. The researchers found that personal characteristics of the CD patient, such as ethnicity, health literacy, and emotions have an impact on the effectiveness of self-management. Lu, Li, and Arthur (2014) found that a barrier to self-management is a patient's own perception of how challenging the personal and social obstacles are for achieving and maintaining a specific behavior. Economic challenges were another barrier to self-management (Grady & Daley, 2014). Resources needed to support optimal self-management associated with PHR use, such as high-speed Internet services and computer hardware, can be very expensive.

Numerous studies found that self-management support programs have a positive effect on CD health outcomes (Dattalo et al., 2012; Jaglal et al., 2014; Ory et al., 2013). Clinical best practice guidelines, established by an expert panel of the Registered Nurses' Association of Ontario (2010), endorsed self-management programs that utilize interventions and practice considerations based on a behavioral change approach (Registered Nurses' Association of Ontario, 2010). The approach includes (a) establishing rapport, (b) screening for depression, (c) establishing a written agenda for appointments, (d) assessing client's readiness for change, (e) combining effective behavioral, psychosocial strategies, and self-management education processes, (f), encouraging monitoring methods and self-management techniques (e.g. diaries,

logs, PHR), (g) establishing goals, action plans, and monitor progress, (h) motivational interviewing, and (i) follow-up.

The Stanford School of Medicine (2014) completed a randomized control study with over 1,000 CD patients. The experimental group attended a chronic disease self-management program (CDSMP) and the control group had conventional instructions. Subjects who participated in the program, when compared to those who did not, demonstrated significant improvement including, but not limited to, communication with providers and self-reported general health. Subjects also spent fewer days in the hospital, and there was also a trend toward fewer outpatient visits and hospitalizations (Stanford School of Medicine, 2014).

The Stanford CDSMP is a validated program that can be implemented throughout the United States. While the program has recognized and excellent results, it has been implemented in only a few United States organizations and practices. Countries such as the Netherlands and Australia have embraced and integrated the Stanford CDSMP into their healthcare system with good results (Detaille et al., 2013; Jaglal et al., 2014).

Based on the reviewed literature it is evident that self-management skills in patients with CD should be promoted and facilitated. An area that is of specific interest to me is the integration of technology to improve CD self-management. Best practice guidelines established by the Registered Nurses' Association of Ontario (2010) recommend the use of the PHR as a monitoring method and self-management technique. This information strengthens the need to conduct translational research in PHR use that addresses the educational needs of patients, particularly CD patients. Interventions and educational activities that promote CD self-management should be promoted and encouraged.

Factors Affecting PHR Use to Manage Health

Evidence-based research findings indicated that the PHR is an opportunity for positive change toward a more person-centered approach and the possibility to improve healthcare outcomes (Daniel et al., 2014). The Registered Nurses' Association of Ontario's (RNAO) expert panel (2010) established evidence-based recommendations that address strategies to support self-management in chronic conditions. Motivational interviewing, educational interventions, and the use of PHRs are identified as best practice guidelines. The RNAO (2010) encourages the use of their toolkit, *Implementation of Clinical Practice Guidelines*, to implement the evidence-based strategies.

Taha, Czaja, Sharit, and Morrow (2013) conducted a quasi-experimental, pre-test/post-test design study where the participants served as their own control. The study examined the participants' ability to perform 15 common PHR tasks that were rated as either simple or complex. Scores were generated on several measures, including the Demographic and Background Questionnaire (Czaja et al., 2006a), the Heart Disease Fact Questionnaire (HDFQ), the Test of Functional Health Literacy in Adults, as well as subjective and objective numeracy, cognitive battery, and overall performance on PHR tasks. Taha et al. (2013) analyzed the collected data using a t-test to determine the difference between groups. Additionally, a regression model with predictor variables was used as an inferential technique. Major findings indicated that variables such as education, Internet experience, cognitive ability, numeracy, and age may predict PHR task performance (Taha et al., 2013).

Patient Engagement

The Office of the National Coordinator for Health Information Technology (ONC) in the Department of Health and Human Services developed a national action plan to empower people to improve their health and healthcare by giving patients access to their health information,

enabling consumers to become involved, and enhancing patient-provider communication (Ricciardi et al., 2013). The ONC (2015d) developed a “Three A’s” strategy: access, action, and attitudes. It is a program that seeks to increase patients’ access to health information, to enable patients to take action based on their electronic health information, and to shift attitudes for patients to become engaged partners in their care (Daniel et al., 2014). Ricciardi, Director of ONC’s Office of Consumer eHealth, reported that a lack of public demand for digital health records is among the greatest obstacles to increase engagement in their own health (Ricciardi & Myrie, 2014). For this reason, the ONC (2015d) launched a “Blue Button” campaign to boost patients’ use of PHRs (ONC, 2015b). The American Nursing Association partnered with the ONC to promote the importance of using the PHR among nurses as well (American Nurses Association, 2015).

Barriers of PHR Adoption

There are a number of barriers for patients to adopt the PHR as a health management tool. The barriers can be grouped into three categories: technical barriers, educational barriers, and socioeconomic barriers. Technical barriers included the lack of interoperable networks between the provider and the patient (Archer et al., 2011), the need for encryption (Burke et al., 2010), and an overall security, privacy, and accuracy concern (Kerns et al., 2013; Yau, Williams, & Brown, 2011).

Educational barriers are tied to patients’ ability to learn new technology. Patients may not be computer literate; they report having poor Internet skills, feeling too old to understand the PHR, or have a non-compliant attitude (Butler et al., 2013; Taha et al., 2013). Additionally, the rate of PHR use and potential adoption may also depend on the availability of office staff for

hands-on training as well as assistance with interpretation of medical information (Noblin, Wan, & Fottler, 2012).

Socioeconomic barriers are related to patients' financial challenges including the inability to purchase a computer or Internet services. Butler et al. (2013) found that some patients do not trust the computer and others are even afraid of it. Yamin et al. (2011) indicated that healthier patients under the age of 35 were less likely to adopt the PHR.

Facilitators of PHR Adoption

There are numerous studies that identified inter-related components that may lead to PHR adoption. First, it is necessary for healthcare providers to offer a PHR. Kerns et al. (2013) found that "patients perceive the PHR as relevant, trustworthy, and functional when offered to them through their healthcare provider" (p. 7). Thus, provider support is essential for patient PHR adoption.

Secondly, patients have reported satisfaction with being able to personally control and self-manage their care with features such as easy access to test results, a reminder system, medication refill options, appointment requests, virtual consultations, and PHR e-mail. Archer et al. (2011) noted that those patients feel empowered; the PHR "enhances patient clinician communication and reflects patient centered care" (p. 518).

Finally, it would be reasonable to assume that CD patients are less likely to be attracted using the PHR. Seemingly the recurring need for testing and follow-up visits would provide continuous opportunities to discuss health information with the provider. However, it was surprising to find that frequent users of healthcare services and people with disabilities and chronic conditions are most interested and likely to use the PHR (Ketterer et al., 2013). Noteworthy are three experimental studies that evaluated the benefits of PHR use in chronic

disease management, all in diabetes care (Ho, Newton, Boothe, & Lauscher, 2015; Holbrook et al., 2009; Ralston et al., 2009). One study showed a promising decline in Hemoglobin A1c (HbA1c) levels when patients used the PHR regularly (Holbrook et al., 2009). The other two studies showed a statistically significant HbA1c level decline in the intervention group that used the PHR as a care management tool (Ho et al., 2015; Ralston et al., 2009). Ho and his research team (2015) found a mean reduction in HbA1c levels from 7.41% to 6.77% and reported that portal technologies made participants feel empowered in caring for their diabetes.

Summary

One of the barriers to patient PHR use is an absence of hands-on training and lack of patient education about the information provided in the PHR. This evidence strengthens the need to conduct translational research for PHR use that addresses the educational needs of patients, particularly CD patients.

Both expert and research evidence point to the need to support the use of PHRs by CD patients and to promote their integration into clinical practice (Irizarry, DeVito Dabbs, & Curran, 2015). The evidence is based on expert opinion, qualitative studies, descriptive studies, meta-synthesis of qualitative and descriptive studies, and three randomized control trials. Current research suggests that the CD patient population may benefit from a greater degree of self-management through a PHR. It is thus likely that a project that seeks to improve patients' knowledge about health information technology tools, such as the PHR, will be positively received. Expert evidence, as well as research evidence, supports the need to promote patient PHR adoption.

CHAPTER 3

Methods

This chapter describes the implementation strategy for this study. The project plan is explained in detail, including participant recruiting, the setting, the survey tool to evaluate PHR use, and the protocol. It also includes how the study aims were evaluated.

Study Design

This evidence-based translational research project was conducted in two phases from August 3, 2015 until September 5, 2015. The Demographic and Background Questionnaire (DBQ; Czaja et al. 2006a; see Appendix A), described in detail in the data collection section below, was administered before the PHR educational intervention, and followed by a four-week follow-up survey.

The quasi-experimental approach was used to (a) assess PHR use among chronically ill adult primary care patients, (b) administer a PHR educational intervention, (c) observe factors associated with computer use, and (d) evaluate the effectiveness of the educational intervention among the participants compared to the pair patched control group. Additionally, a qualitative component assessed the participants overall thoughts about the PHR. Harris et al. (2006) indicate that the quasi-experimental design is appropriate for nonrandomized intervention studies and commonly used in medical informatics research when randomized control studies are not feasible. A quasi-experimental methodology is capable of measuring change after an intervention (Polit & Beck, 2012) and is deemed practical and useful in the nursing and health informatics arena (Harris et al., 2006; Moran, Burson, & Conrad, 2014). Harris et al. (2006) found that the use of both a pretest and a comparison group enhance the validity and quality of the measurement method.

As the primary investigator, I completed the online *Protecting Human Research Participants* ethics training modules developed by the Collaborative Institutional Training Initiative (CITI). The course material and certification insured that the wellbeing, safety, and privacy of research participants were protected. As an additional safeguard, the Institutional Review Board of Georgia College and State University reviewed this proposal and approved the study (Appendix B). A memorandum of understanding was signed between the medical director of the clinical research site, and Georgia College and State University on November 11, 2014.

Issues related to potential loss of privacy for participants were addressed in preparation for conducting this study. Participants selected a three-digit number in lieu of a name for matching the pre-intervention data with the follow-up phone survey results. The audio recordings as well as all results were kept completely confidential. A secure webserver was used to deliver and analyze the survey information. All records were de-identified and stored in a locked area throughout the duration of the study and will be completely destroyed after three years.

Setting

This study took place at a primary care group practice (PCGP) in Lake County Florida. The practice provides integrated healthcare services including health promotion, disease prevention, health maintenance, nutritional counseling, patient education, and diagnosis and treatment of acute and chronic conditions. The practice also has an internal medical laboratory providing clinical specimen testing services to their patients.

At the time of the study, the PCGP local town had a population of approximately 30,033 people (U.S. Census Bureau, 2015). In terms of demographics, the population was 57% White, 19% Hispanic, and 16% African American. The median household income in 2012 was \$52,184

(Advameg, 2012) . Life expectancies of County residents were lower than the state and national average; the majority of deaths were attributed to chronic disease (CD) such as heart disease, chronic obstructive pulmonary disease, and diabetes (Florida Department of Health, 2014).

The PCGP clinic staff consisted of eight full- and part-time primary care providers (five physicians and three physician assistants), four licensed practical nurses, seven certified medical assistants, and a dietician. Non-clinical staff included six medical office assistants staffing the front desk, six medical billing and coding specialists, and three medical laboratory technicians. With the exception of Medicaid, the PCGP accepted most commercial insurance plans as well as Medicare.

The PCGP patient population totaled approximately 6,500 individuals with 75% White, 5% Hispanic, and 10% African American patients. The practice averaged about 120 patient visits per day. The PCGP did not provide services for pediatric patients. The PCGP patient population age ranged from 18 to 102 years with an average age of 65 years.

In 2011, the practice transitioned from paper-based medical records to using eClinicalWorks, an electronic health record (EHR). The practice partners also decided to participate in the Medicare EHR Incentive Program that provides governmental reimbursement when EHR technology is used in ways that can positively impact patient care. In order for clinicians to participate in this program they must be: (a) eligible, (b) registered, (c) use a certified EHR, (d) demonstrate and prove Meaningful Use, and (e) receive reimbursement (Centers for Medicare & Medicaid Services, 2010).

Meaningful Use has to be demonstrated in multiple stages. For stage 1, the Centers for Medicare and Medicaid Services (CMS) established objectives that all providers have to meet. Some objectives require a minimum percentage reporting in order to show that providers use

their EHR in ways that can positively affect their patients' health, others specify an action that must be taken to prove Meaningful Use (Centers for Medicare & Medicaid Services, 2010).

The PCGP registered for reimbursement in 2012 and successfully reported and met Meaningful Use Stage 1 criteria in 2013. To demonstrate Meaningful Use Stage 2 criteria, the providers must meet 17 core objectives and three menu objectives (Centers for Medicare & Medicaid Services, 2012). One of the Meaningful Use Stage 2 core objectives included to "provide patients the ability to view, download, and transmit their health information online" (Centers for Medicare & Medicaid Services, 2012). eClinicalWorks delivers this requirement with an integrated PHR application called Healow (eClinicalWorks, 2015). As of July 2015, the PCGP met Meaningful Use Stage 2 by enrolling 5% of their patient population for PHR use. Every newly enrolled patient receives a Healow PHR sign in with a temporary password. After signing into the PHR, the patient is prompted to choose a personal password. Patients who use the PHR are then able to view their medical records and use a secure messaging system to communicate with their PCGP health team electronically.

Sample

Sample Size

The PCGP patients scheduled from August 3 to August 18, 2015 were recruited for this study. A power analysis was conducted to determine an adequate sample size. Given an anticipated effect size (Cohen's d) of 0.8, a desired statistical power level of 0.8, and a probability level of 0.05, the calculated minimum required total sample size was 42. Accordingly, the goal was to recruit up to eight participants per day with an anticipated total enrollment of 50-80 individuals within a ten business day period.

Recruiting

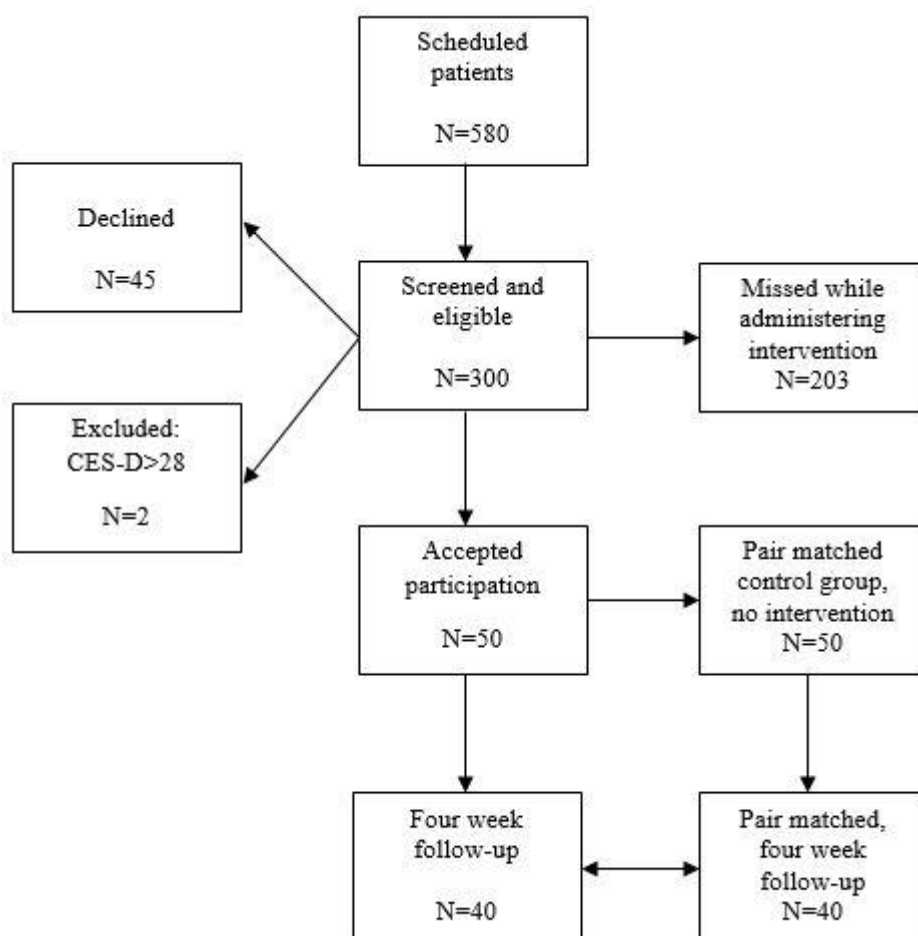


Figure 3 Flowchart for recruiting.

During the ten day study implementation period 580 individuals were scheduled for clinic appointments (see Figure 3). All medical records were screened; 300 individuals met the study eligibility criteria. A total of 52 individuals agreed to participate, 45 declined, and 203 were not approached during checkout while I was providing the educational intervention to individual study participants in a private office. Two individuals scoring greater than 28 on the Center for Epidemiologic Studies Depression Scale (CES-D) were excluded from participating in the study.

Inclusion Criteria

Participants had to be 40 to 85 years old, diagnosed with a chronic condition, and speak English fluently. For the purpose of this study, the CD operational definition by the World Health Organization (2011) was adopted: A CD involves ongoing management over a period of years and includes, but is not limited to, heart disease, stroke, cancer, chronic respiratory diseases, and diabetes (World Health Organization, 2011).

Exclusion Criteria

Exclusion criteria were any mental, depressive, behavioral, or physical conditions that would preclude participants from completing a 20-minute questionnaire and a ten-minute educational intervention, as determined by the treating primary care provider (PCP). Depression was measured using the CES-D Scale; potential subjects with a score of 28 or greater were excluded from the study and a follow-up appointment with the subject's PCP was arranged the same day. The cognitive symptoms of depression, such as loss of interest and fatigue would inhibit the participant's ability to engage fully in the PHR educational activity (Czaja et al., 2013; Sharit, Hernandez, Czaja, & Pirolli, 2008).

Data Collection

This study used two quantitative and one qualitative source for outcomes: the pre-intervention Demographic and Background Questionnaire (Czaja et al., 2006b), EHR data, and a four week post-intervention follow-up phone interview.

Pre-intervention Survey

Taha et al. (2013) found that PHR use is influenced by education, age, and socio-economic background, as well as computer use attitudes and experience. Taha et al. gained the information primarily through the administration of the Demographic and Background Questionnaire (DBQ) survey instrument (see Appendix A; Czaja et al., 2006b). The DBQ was

developed in 2006 by a team of researchers from the Center for Research and Education on Aging and Technology (CREATE) at the University of Miami and published as Technical Report CREATE 2006-02 (Czaja et al., 2006b). The survey is a validated tool with five sections: (1) demographics, (2) health information, (3) Center for Epidemiologic Studies Depression Scale (CES-D), (4) Computer Questionnaire 1, and (5) Computer Questionnaire 2.

According to Czaja et al. (2006a), one purpose of the DBQ survey is to examine issues related to the successful use of technology by older adults. The questionnaire gathers information related to the use and perceptions of technical systems and can be used to establish a relationship between demographics, abilities, and the use and adoption of technology. The DBQ consists of questions in multiple-choice or a five point, Likert Scale, format; it is in large print to facilitate readability and requires about 25 minutes to complete. Permission to use the DBQ for this study was obtained from Dr. Sara Czaja's, the instrument developer and director of CREATE. The DBQ was administered in its entirety before the educational intervention. The following paragraphs describe the components of the DBQ and the data collection for this study in detail.

Demographics section. The demographic questions included 11 multiple-choice items that assess socio-demographic information including age, gender, level of education, marital status, primary language, and ethnicity. Participants also responded to questions regarding type of housing, level of income, occupational status, and mode of transportation. Descriptive statistics was used to generate sample characterizes.

Health information section. The health information section consisted of a seven-item health assessment questionnaire. Participants were asked about their overall health, satisfaction with health, health related limitations of basic activities, and chronic health conditions such as

hypertension and diabetes. Response options included a five point Likert Scale that asked participants to rate their health. It also includes response options with items that range activities from one to three (1 = Limited a lot, 2 = Limited a little, 3 = Not limited at all). Participants were also asked to rate the extent to which health conditions get in the way of performing routine activities. In addition, they were asked to rate the extent to which they experienced functional limitations (e.g., carrying, walking) and to indicate current chronic conditions. The participants reported their chronic condition by indicating the presence of listed CDs as “in your lifetime”, “now” or “never”.

Data generated from the health information section were used to evaluate age-related differences between middle-aged participants (age 40 - 62) and older participants (age 63-85); inferential statistics, specifically Chi Square (χ^2), compared the frequencies that were observed with the frequencies that were expected.

Center for Epidemiologic Studies Depression Scale (CES-D). The CES-D Scale is a 20 item self-report psychological screening instrument available in the public domain; it was originally published by Radloff in 1977. The survey items are statements related to symptoms associated with depression such as restless sleep, feeling lonely, and poor appetite. The CES-D Scale was used in this study to screen for potential depression. Participants rated each item by indicating how many times they experienced the event described during the previous week using a scale from 0 (rarely or none of the time) to 3 (most of the time). Total CES-D Scale scores are summed to obtain a composite score that may range from 0 to 60, with higher scores indicating increased presence of depressive symptoms (American Psychological Association, 2015).

Radloff's (1977) original instructions for summing the items suggest to reverse the scores of four CES-D Scale items, reducing the total score by 12 points with an overall consensus that

participants scoring 16 or higher are deemed clinically depressed. The CES-D Scale has been used successfully with different age ranges and provides good sensitivity and specificity and high internal consistency (Lewinsohn, Seeley, Roberts, & Allen, 1997).

Czaja et al. (2006b) integrated the CES-D Scale into the DBQ to identify individuals with conditions that may affect learning and PHR task performance. Multiple studies indicate that depressive symptoms have an adverse effect on immediate recall of new information and may interfere with learning new tasks such as using a PHR (Jones, Siegle, Muelly, Haggerty, & Ghinassi, 2010; Kizilbash, Vanderploeg, & Curtiss, 2002).

Data generated from this study were used to evaluate a potential association between PHR use following an educational intervention and depression scores. Additionally, possible gender or age related group differences were examined using analysis of variance inferential statistics. Respondents who scored 28 or higher were excluded from participating in this study and were instantly referred to the individual's PCGP provider.

Computer questionnaire 1. The Computer Questionnaire 1 (CQ1) is a technology and computer attitude survey. The questionnaire was used to evaluate attitudes toward computers prior to receiving the educational intervention. The CQ1 measured the degree to which participants agreed with 15 statements concerning their attitudes toward computer use. Response options range from one to five (1 = strongly agree to 5= disagree strongly). Sample statements include: "Computers make me nervous" (anxiety related attitude); "I know that if I worked hard to learn about computers, I could do well" (efficacy related attitude); "Learning about computers is a worthwhile and necessary subject" (utility related attitude); and "I don't care to know more about computers" (interest related attitude).

The 15 items measured the respondent's level of confidence, anxiety, efficacy, utility, and interest toward computer use. To compute a CQ1 composite score, the scores for eight of the 15 items were reversed. The total score may range from 15 to 75 where the lower range indicates negative and higher scores positive attitudes toward the use of computers.

The data generated from CQ1 were used to examine age-group and gender differences in computer attitudes using an analysis of variance. Descriptive statistics was used to describe the sample's computer use attitudes. In addition, the item "I feel comfortable with computers" was used as a repeated measure, in the four week post-intervention follow-up phone interview.

Computer questionnaire 2. Participants who reported having experience with computers responded to questions concerning the extent of their typical computer use. It is the final section of the DBQ titled Computer Questionnaire 2 (CQ2); a 31-item assessment that measures perceptions of experiences with computers (e.g. frustration), with technical support, and with past training. The participants had to respond to statements that ranged from strongly agree to strongly disagree on a five-item Likert scale. Both, CQ1 and CQ2, have been widely used in the literature and have demonstrated reliability and validity (Boot, 2013; Czaja et al., 2006a; Taha et al., 2013). The data generated from CQ2 were summarized using descriptive statistics to examine participants' perceptions of their computer use experience.

EHR Data

An EHR audit was performed to evaluate the effectiveness of the educational intervention. The frequency of PHR messages sent to providers and office staff by participants was counted over a four-week period following the educational intervention. The total number was then compared to a pair matched (non-participant) control group.

Post-intervention Follow-up Phone Interview

A post-intervention follow-up phone survey was conducted four weeks after the educational intervention. During the call, I asked the participant to respond to four questions. The first question was “How often have you used the patient portal over the past four weeks?” Data generated from this question examined the rate of PHR use. The second question was “From 1 = strongly disagree to 5 = strongly agree, rate the following statement: I feel comfortable using the patient portal.” Data generated from this question were compared to the pre-intervention answers to identify computer use comfort level differences among participants. The third question was “From 1 = strongly disagree to 5 = strongly agree, rate the following statement: I will continue to use the patient portal in the future.” Data generated from this question were used to identify participants’ intentions for future PHR use. The final question was the qualitative component of the study; participants were asked “What are your overall thoughts about the patient portal?” Participant answers were organized by their pattern to identify specific themes.

Protocol

DBQ and Educational Intervention

The purpose of this research was to evaluate PHR use of middle-aged adults (40-62 years) and older adults (63-85 years) after an educational intervention using the eClinicalWorks Healow PHR software application offered by the PCGP. The plan was to recruit 50 to 80 participants. Patients, scheduled to visit one of the PCGP providers, were screened for eligibility a day before their scheduled appointments. Eligible individuals were approached upon checkout at the conclusion of their visit with the provider.

Each eligible individual, who agreed to participate in the study, was interviewed in a private office. I then reviewed the informed consent with the participant (see Appendix C). The

DBQ administration began after participant questions were answered and signed consent was obtained. I then handed the participant a paper copy of the survey, read each survey question to the participant aloud, and then documented the respondent's answers in Qualtrics. A digital audio recorder was used to document the participant's answers.

Upon completion of the DBQ, the educational intervention took place. Each participant received a hands-on PHR demonstration, using the eClinicalWorks Healow application. The instructions included how to (1) log-in (2) verify his/her current medication list, (3) download the Personal Health Record, (4) view his/her lab results, (5) send a message to his/her provider, (6) review the visit summary, and (7) sign-out.

Upon completion of the intervention, participants received a refrigerator calendar magnet as a "thank-you" token. They were reminded to use their PHR during the following four weeks and that there will be a post-intervention follow-up phone interview. Upon completion of the study, participants had the option to select one of three five US Dollar gift card options.

Follow-up Phone Interview

Each participant was contacted by telephone exactly four weeks after the educational intervention. This investigator asked the participant to respond to the four post-intervention follow-up phone interview questions (listed in the above data collection section). Participants' answers were audio recorded. At the end of the follow-up interview, the participants were be offered a five US Dollar merchant gift card as a token of appreciation for completing the DBQ and the follow-up phone survey.

Pair Matching

Matching involves using knowledge of subject characteristics to form a comparison group to evaluate the effect of the intervention by comparing the treatment group with the pair

matched control group (Polit & Beck, 2012). A pair matched control group allows comparison of PHR use among the participants that received the educational intervention and non-participants.

Once the initial survey was completed, the PCGP EHR was accessed to pair match each participant with a non-participant who had equal characteristics. Pair matched variables included a chronic condition, age (+/- 5 years), gender, and ethnicity. As a research associate, the investigator had access to the PCGP eClinicalWorks EHR with an established username and password. The EHR report writing feature allows authorized users to generate a specific report with criteria such as age, gender, and ethnicity used to determine pair matching.

Data Analysis

The data analysis process involved three steps. First the survey data results were exported from Qualtrics (n.d.) into Microsoft Office 365 Pro Plus Excel version 15.0.4753.1003 to screen for errors and missing values. Two participants failed to provide responses to the CES-D Scale questions; these missing data were substituted with the mean sample value. Next, the data set was imported into SPSS version 22 (IBM Corp, 2013). The explore feature was used to further assess the data set to include testing for normality. It was noted that the only variable with a normal distribution was the total CES-D Score and the CQ1 and CQ2 composite scores. The final step of the data analysis included the use of nonparametric tests; Chi-square (χ^2), Mann-Whitney (U), and Wilcoxon Signed Ranks Test (Z), which were used to identify significant findings. The data analysis explored the relationship between the variables, compared the middle-aged adult group with the older adult groups, and explored the significance of group differences.

Study Aims

The research plan was designed to identify data that can ultimately be transformed into information to address the four study aims of this research project. Two data analysis approaches were chosen. The quantitative approach was applied to study aims I, II, and III; and a qualitative data analysis approach was utilized to interpret the nonnumerical observations for study aim IV.

Study aim I. Participant responses of the CQ1 statement “I feel comfortable with computers” was a pre- and post-intervention measure that addressed study aim I: Assess the computer-use attitudes among adult primary care patients (participants) who have a chronic condition in Lake County Florida before and after a PHR educational intervention. To determine potential group differences, an analysis of variance (ANOVA) was conducted. It tested variances between the middle-aged and older as well as gender related group differences related to the variable “computer comfort”.

The Wilcoxon Signed Ranks Test was used to measure the changes that occurred between the pre-test and post-intervention response to the “computer comfort” CQ1 item. The Wilcoxon is an alternative to the paired sample t-test and was used to measure the degree to which the educational intervention had an effect on participants’ computer use comfort level. The Wilcoxon Signed Ranks Test is a nonparametric test and is applied when data are not normally distributed (Kim & Mallory, 2014).

Study aim II. The total number of PHR messages sent to providers and office staff by participants over a four week period following the intervention were analyzed using descriptive statistics to examine the rate of PHR use within a four week time period after the educational intervention. Additionally, inferential tests such as Chi Square analyzed differences between the

age groups. Chi Square, a nonparametric test, allows to make a determination if what is observed in the distribution of frequencies would be what is expected to occur by chance.

Study Aim III. The total number of PHR messages sent to providers and office staff by participants over a four week period following the intervention was compared to the total number of PHR messages sent by the pair matched (non-intervention) control group. These measures were analyzed to evaluate the effectiveness of the educational intervention.

Study Aim IV. The qualitative measure for this study was evaluated by analyzing respondents' answers to the post-intervention follow-up phone interview question: "What are your overall thoughts about the patient portal?"

Summary

This research study used a quasi-experimental design with a static group comparison method where two groups were examined – one with the educational intervention and one without – and then a follow-up survey assessed the result of the intervention. While the design does not include randomization of subjects, the methodology of this study was thoroughly planned to provide results that are appropriate to generalize to the chronically ill adult primary care patient population.

CHAPTER 4

Results

The results of this quasi-experimental study assessing PHR use and the effectiveness of the educational intervention which utilized an educational intervention group and a control group are discussed in this chapter. Reported findings include descriptive information about the participants, participants' perceptions of their health ratings, and pre- and post-test results for attitudes about computer use related to PHR. Statistical data addressing each research question are also presented.

Data Analysis

Sample description. As shown in Table 1, the sample included 50 adults (17 male and 33 female) ranging in the age from 47 years to 81 years ($M = 64.82$, $SD = 7.78$). For analysis purpose, the participants were divided into a middle-aged (40-62 years) adult group and an older (63-85 years) adult group. There were 15 participants (3 male and 12 female) in the middle-aged adult group and 35 participants (14 male and 21 female) in the older adult group.

The sample had an alike ethnic background: there were 46 (92%) white participants, two (4%) Hispanics, one (2%) African American, and one (2%) Asian participant. Among the participants, 30% ($n = 15$) had a high school education or less, 32% ($n = 16$) had some college or an Associate's degree, 24% ($n = 12$) held a Bachelor's, and 14% ($n = 7$) had a graduate or postgraduate degree. The sample was fairly well educated; there were no significant differences between the two age groups in regards to the level of education. Of the sample population, 42 % ($n = 17$) reported working full- or part-time, 2% ($n = 1$) were actively seeking employment, 8% ($n = 4$) were disabled, and 48% ($n = 24$) were retired.

Table 1*Sample Description*

Gender	Middle aged (n, %)	Older (n, %)	Cumulative Total (n, %)
Number	18 (36%)	32 (64%)	50 (100%)
Age	(56.4; 4.1)	(69.5; 4.8)	(<i>M</i> 64.8; <i>SD</i> 7.8)
Gender			
Male	6 (35%)	11 (65%)	17 (34%)
Female	14 (42%)	19 (58%)	33 (66%)
Education			
≤ High school	8	7	15 (30%)
Some college	5	11	16 (32%)
College degree	4	8	12 (24%)
Post college degree	2	5	7 (14%)
Occupational status			
Part/full-time job	9	12	21 (42%)
Retired	6	18	24 (48%)
Disabled	4	0	4 (8%)
Seeking job	0	1	1 (2%)
Ethnicity			
White	16	30	46 (92%)
African American	0	1	1 (2%)
Asian	1	0	1 (2%)
Hispanic	2	0	2 (4%)
General Health			
Poor, fair	4	1	5 (10%)
Good, very good	13	29	42 (84%)
Excellent	2	1	3 (06%)

Note. *n*=number of participants

There was a significant difference among the age groups with respect to occupational status, $\chi^2 (5, N = 50) = 11.001, p = .05$. As expected, the middle-aged adults were employed and the older adults were retired. Regarding annual income, 7 participants (16%) reported an annual income of less than \$30,000; 22 participants (49%) had an income range from \$30,000 to \$69,999, and 16 participants (36%) had an income greater than \$70,000. Five participants did not provide their annual income data.

Health information. Participants were asked to rate their general health and health for their age (poor to excellent) and satisfaction with health (not at all satisfied to extremely satisfied) on a 5-point Likert scale. They were also asked to rate the extent to which health conditions got in the way of performing routine activities. In addition, they were asked to rate the extent to which they experienced functional limitations (e.g. lifting, running) and to indicate current chronic conditions.

There were age-related differences for general ratings of health, $\chi^2 (3, N = 50) = 8.58; p = .05$. Participants of the middle aged adult group were more likely than the older group participants to rate their health as poor or fair and reported lesser satisfaction with their health. There were also age differences with respect to the type of chronic conditions reported $\chi^2 (2, N = 50) = 7.407; p = .05$. The older group participants more frequently reported diabetes as a current condition than the middle aged people. There were no differences with respect to the extent to which health problems affected performance of routine activities or health-related limitations.

Center for Epidemiologic Studies Depression scale (CES-D). The 20-item CES-D scale (Radloff, 1977) has response categories that indicate the frequency of occurrence of each item, and is scored on a 4-point scale ranging from 0 (rarely or none of the time) to 3 (most of the time). The scores of each participant was totaled; the total scores may range from 0 to 60.

Data were examined using one way ANOVA. No significant gender differences or age group differences were present. However, when the Spearman's rank-order correlation was used to determine the relationship of participants' depression scores and their self-reported PHR use, a small, negative correlation was found. The correlation was statistically significant, $r_s(50) = -.286$, $p < .05$ indicating that participants with higher CES-D scores used the PHR less and participants with a lower CES-D score used the PHR more often.

Attitudes toward computers. All participants completed the Computer Questionnaire 1 (CQ1), a 15-item multidimensional scale assessing five dimensions of attitudes toward computers: comfort (feelings of comfort with computers and their use), efficacy (feelings of competence with computers), interest (the extent to which one is interested in learning about using computers, and utility (the belief that computers are useful). Participants were required to indicate the degree to which they agreed with the 15 statements (e.g. "I feel comfortable with computers") with a 5-point Likert scale from strongly agree to strongly disagree. A composite score was obtained by summing responses (0-17). Overall, it was found that 60% ($n = 30$) of the participants had an overall positive attitude toward computers (composite score of 56-75), with low anxiety levels and high levels of confidence, interest, efficacy and utility. None of the respondents reported negative attitudes (composite score 15-35) and 40% ($n = 20$) had a moderate attitude toward computers.

Age-group and gender differences in computer attitudes were examined with univariate two (gender) by two (age group) ANOVAs. No significant age by gender interactions were found for the computer attitude composite score. Neither the difference between the middle-aged women and the middle-aged men nor the difference between the older-aged women and older-aged men was significant for these variables.

Computer experience. Participants who reported computer experience in Computer Questionnaire 1 were asked to respond to Computer Questionnaire 2 (CQ2) that pertained to training, perceptions of experiences with computers (e.g. frustration), and technical support. Participants were required to indicate the degree to which they agreed with the 31 statements (e.g. “I am usually curious to use the latest version computer software”) with a 5-point Likert scale from strongly agree to strongly disagree. A breath-of-computer-experience variable was computed by summing responses to all 31 items. Overall, there was a wide variety of computer experience within the sample population. Men reported being more comfortable using new applications and software as well as taking advantage of computer training.

Study aim I. The purpose of study aim I was to assess the computer-use attitudes among adult primary care patients (participants) who have a chronic condition in Lake County Florida before and after a PHR educational intervention. Overall, the majority (60%) of the participants reported low levels of anxiety, and high level of confidence, efficacy, utility and interest. Some (40%) had moderate levels of anxiety, confidence, efficacy, and interest. No one reported high levels of anxiety, low confidence, efficacy, and interest. Univariate ANOVA testing indicated no difference between the between the middle-aged women and the middle-aged men and no difference between the older aged women and older aged men.

The Wilcoxon Signed Ranks Test was used to identify differences when subjects have been monitored on two different occasions (Kim & Mallory, 2014). This nonparametric alternative to the paired sample t-test was used to identify whether the educational intervention had an effect on the participants’ computer use comfort level. The Wilcoxon Signed Ranks Test indicated that the computer use comfort level was statistically significantly higher four weeks after the PHR educational intervention $Z = -1.668$, $p < .005$ (one-tailed).

Study aim II. The purpose of study aim II was to examine the rate of PHR use by participants within a four week time period of the educational intervention. Of the overall participant group (N = 50), fewer than half of the participants 48% (N = 24; 14 women, 10 men; M = 1.08; SD = 1.95) chose to utilize the PHR as a communication tool after the educational intervention and sent a total of 54 PHR messages to their providers (see Table 2). There was no significant difference between gender and middle-aged and older adults.

Table 2

Frequency distribution of PHR message sent by participants

Number of messages	Participants (n)	Percentage (%)	Cumulative (%)
>5	2	4	4
2-5	7	14	18
1	15	30	48
0	26	52	100

Note. n=number of participants

Forty participants answered the follow-up survey (80% response rate). Of those 18 (45%) used the PHR 1-2 times within four weeks after the educational intervention, 15 (37.5%) used the PHR 3-4 times, and seven (17.5%) used the PHR 5-7 times. There was no statistically significant difference between the middle-aged adult and older adult age groups. The follow-up survey indicated that 80% (n = 32) confirmed intentions of future PHR use, 12.5% (n = 5) were unsure, and 7.5% (n = 3) declined future PHR use for reasons such as privacy and security concerns, content not being current, and not being a good match with the respondents lifestyle.

Study aim III. The purpose of study aim III was to evaluate the effectiveness of the educational intervention in improving PHR adoption among the study participants in comparison

with a matched set. Participants who attended the educational intervention sent a total of 54 PHR messages to their provider compared with 12 by the non-participant group (see Table 3).

Table 3

Frequency distribution of PHR messages sent by participants compared with control group

Group	Total Number of Messages sent Frequency (<i>f</i>)	Mean (<i>M</i>); Standard Deviation (<i>SD</i>)	Total Number of Individuals who sent Messages (<i>n</i>)
Participants	54	1.08; 1.95	24
Non- Participant Control Group	12	0.16; 0.71	4

Note. *n*=number of participants

The Mann-Whitney U test was used to compare two independent samples and answered the question: Was the PHR use, measured by the number of messages sent, higher for the intervention group than for the matched control group? The test results indicated that the amount of PHR use differs significantly in the participant group that received the educational intervention ($M = 1.08$) compared to the matched control group ($M = 0.16$), $U = 735.5$, $p = .001$.

Study aim IV. The purpose of study aim IV was to identify individual participants' thoughts about the PHR. A word-based technique was used for a qualitative analysis of the follow-up survey question: "What are your overall thoughts about the patient portal?" Word repetitions indicate that certain ideas were important and thus indicated recurring themes. The following major themes were identified: Information availability, training, PHR application usability, provider connectivity, and privacy as well as security concerns (see Table 4).

Table 4

Representative participant comments on overall thoughts about the PHR

Themes	Subthemes	Representative quotations
Information availability	Lab values	<ul style="list-style-type: none"> ● I won't continue to use the portal if the information is not updated. My lab work is old. ● The labs are not updated. The system is tremendous but of no value if the information is not current.
	Suggestions	<ul style="list-style-type: none"> ● How come someone cannot come up with a connection to all medical portals? ● There are no billing records. I could not verify information from my insurance. ● It would be nice to edit my medication list. I am taking daily vitamins that are not listed.
Training		<ul style="list-style-type: none"> ● Thank you for taking time [to train me] I would have not used it [without the training].
Usability	Barrier	<ul style="list-style-type: none"> ● I won't use it unless the information is current ● I have no Internet in my house
	Positive experience	<ul style="list-style-type: none"> ● It is user friendly and easy to use
	Negative experience	<ul style="list-style-type: none"> ● It is still easier for me to call than using the portal.
Provider connectedness		<ul style="list-style-type: none"> ● I have a personal link to my doctor ● It is really good to be able to message the physician instead of having to get hold of somebody by phone
Privacy and security		<ul style="list-style-type: none"> ● I was not sure in the beginning. I questioned the security and safety; but I feel it is a good thing.

Summary

The purpose of this data analysis chapter was to transform the collected data into evidence about the effect of the educational intervention on PHR use. Multiple data analytic techniques were utilized in this research study. In addition to descriptive and inferential statistics that gave an insight into the quantitative research components, a content analysis was used to determine the participant's overall thoughts about the PHR.

Chapter 5

Discussion

The purpose of this study was to assess the computer-use attitudes among adult primary care patients with a chronic condition. The goal was to examine the rate of portal personal health record (PHR) use of middle-aged and older adults, to evaluate the effectiveness of an educational intervention in improving the rate of PHR use, and to identify patients' thoughts about the PHR.

Despite the availability of PHRs for more than 10 years, less than 10% of US healthcare consumers actually use the PHR to monitor their health information and to communicate with their healthcare provider (Markle Foundation, 2011). Primary care providers (PCPs) make PHRs available to their patients; however, offering the PHR does not ensure successful use by patients (Krist et al., 2014). Studies indicate that PHR use and potential adoption is more likely if the healthcare provider offers a structured program with hands-on training as well as assistance with interpretation of medical information (Noblin et al., 2012).

This study examined the effect of an educational intervention on PHR use by adult patients with chronic disease and explored participants' opinion about the PHR in a follow up survey. I found that patients were more likely to use the PHR following the educational intervention as compared to the non-participant control group. Moreover, participants' computer use comfort level increased significantly four weeks after the PHR educational intervention. The qualitative component of the study indicated that patients are willing to use the PHR if their laboratory results are up-to-date and available for review.

Hands-on PHR Training: Increased PHR Use and Elevated Comfort Level

Earlier studies mostly used methodologies that observed and explored individual attributes related to older patient PHR task performance (Czaja et al., 2006a; Taha et al., 2013)

and identified factors that influence PHR adoption (Logue & Effken, 2012; Tenforde et al., 2011). This study was designed as a nonrandomized experiment, using a pre-post intervention study design with a pair matched control group in an attempt to understand cause and effect of education on PHR use.

There was a clear-cut effect as a result of the educational intervention: The participant group learned to use the PHR as a communication tool and felt overall more comfortable using the computer. In short, the significant difference between the educational intervention group and non-participants confirms the positive effect of the educational intervention on using the PHR and overall comfort level using computers. These findings correspond to results of most studies that used, to some extent, similar interventions (Cody, Dunn, Hoppin, & Wendt, 1999; Czaja et al., 2013; Mori & Harada, 2010; Shapira, Barak, & Gal, 2007; Wolfson, Cavanagh, & Kraiger, 2013).

This quasi-experimental research is different from other studies for the unique selection of outcome measures. To the best of my knowledge, this is the first study to utilize Logue and Effken's (2012) Personal Health Record Adoption Model (PHRAM) as an explanatory model to test an educational intervention to maximize PHR adoption.

This study was designed to measure "computer use comfort level" (PHRAM personal factor) and "PHR use" (PHRAM technology factor) after a hands-on educational intervention with chronic disease patients (PHRAM chronic disease factor). The results indicate that these unique factors contribute to patients' acceptance of technology use to improve their health. These findings support the need for additional studies that develop and test interventions associated with factors identified in PHRAM to maximize facilitators and minimize barriers to PHR adoption.

PHR Use: Of no Value if Information is Not Current

The current study also focused on a qualitative component that evaluated the participants' response to their overall thoughts about the PHR. The responses indicated that patients are willing to use the PHR if their laboratory (lab) values are current and updated. The participants of this study very much valued their lab results being available for review and actually stated that they "won't continue to use [the PHR] if the information is not updated" and that "the system is [...] of no value if the information is not current."

It is more than evident that patients want their data. This request is in line with a final rule published by the Center for Medicare and Medicaid Services (CMS) on February 6, 2014 that gives patients a means of direct access to their individual and complete lab reports. The patients' access to lab test reports relates to an ongoing effort to engage patients in their own care and to be an informed partner with one's health care providers (U.S. Department of Health and Human Services, n.d.).

Despite the growing emphasis of patient data sharing, it has been challenging for primary care providers to make their patients' lab results available in the PHR for three reasons. First, most physicians' offices feel an obligation to interpret the data for the patient in person during a patient visit before making the data available in the PHR (Frellick, 2014). Second, some providers do not know how to transform the data within the EHR application from the provider view into the PHR view. For example, the EHR eClinicalWorks requires a three-step process to change the lab results to enable PHR viewing. In case of the study site, a training schedule has been created to bring each provider up-to-date on the CMS ruling and to explain how to make the lab values available to the patient in HEALOW, the eClinicalWorks' PHR application. Third, providers would like the ability to annotate the lab results with notes to allow them to

interpret the report for their patients (Frellick, 2014). However, this feature is not yet available in most PHRs, including HEALOW, the PHR utilized at this study's clinical site.

While providers are adjusting to the requirement to release results within four days to meet the Meaningful Use requirements (Centers for Medicare & Medicaid Services, 2012), one concern that will have to be addressed in the future: The case of patients finding abnormal or sensitive test results. Direct notification of abnormal results through the PHR may lead to patient confusion and anxiety (Giardina, Modi, Parrish, & Singh, 2015). Research to develop standardized clinical best practices and evidence-based strategies are desirable to help patients understand and manage the information they receive in the PHR.

No Age Related Differences

This study also examined age-related differences by comparing middle-aged and older adults' use of computers. A large number of human factor studies indicate that older adults have more difficulties than their younger counterparts do in learning computer applications (Charness, 2008; Czaja et al., 2006a; Taha et al., 2013). One of these studies conducted by Taha et al. (2013) found significantly lower levels of overall task performance among older participants compared with the-middle-aged participants. Human factor researchers suggest that the difficulties older adults experience are due to aging related diminished perceptual and cognitive abilities.

Nevertheless, this study failed to show age related differences among reported factors associated with computer use by the participants. The implications of this finding may be two-fold. First, it appears that the hands-on educational intervention format met the unique needs of both age groups of this study, the middle –aged and older adults. The finding is in line with recent studies that suggest that training tailored to the individual learner's needs may close the

computer technology related age gap and satisfy the needs of older learners (Barnard, 2013; Czaja, Sharit, Nair, & Lee, 2009). Second, all participants were diagnosed with a chronic condition. Studies indicate that patients with chronic conditions usually have more office visits, laboratory tests, and self-management needs (Agarwal, Anderson, Zarate, & Ward, 2013; Longo, 2005). Krist et al. (2014) found that a chronic condition is a predictor and key factor influencing PHR use. Chronically ill patients seem to be highly motivated to engage with their providers; this unique attribute may lead to overcoming age-related learning barriers as reported by human factor researchers (Charness, 2008; Czaja et al., 2006a; Taha et al., 2013).

An interesting finding that does not involve the effect of the educational intervention was the negative correlation of the Center of Epidemiologic Studies Depression Scale (CES-D) scores related to PHR use. The outcome endorses prior studies (Jones et al., 2010; Kizilbash et al., 2002) that indicate that depressive symptoms may interfere with learning new tasks such as using the PHR. This finding also reiterates the need to exclude participants with cognitive symptoms of depression when measuring the effect of an educational intervention on PHR use. Loss of interest and fatigue would inhibit the participant's learning abilities, inhibiting to engage fully in a PHR use educational activity.

Limitations

As in virtually any empirical research, this study has several limitations including small sample size, single geographic region, and a lack of sample diversity. First, the study was relatively small with only 50 participants. Second, the setting was restricted to a single geographic region. This researcher recommends replication in other settings to broaden generalizability. Third, the sample lacked a diverse ethnic background. The participant group was rather homogenous and dominated by mostly white, educated participants. Nevertheless, the

demographic sample combination mirrors the overall primary care group practice (PCGP) patient demographic. The PCGP is a well-established practice within the local community; it is likely that the exclusion of Medicaid and the predominant use of commercial insurance plans and Medicare may have contributed to a lack of a more diverse and potentially underserved patient population.

Summary

This study demonstrates that an educational intervention will improve PHR use among chronically ill adult primary care patients. The characteristics of PHR users as well as the educational intervention format may represent an important context for further research. PHRs support self-management and represent a way to engage patients. However, the PHR will continue to be underused if data are not current, not made available, or withheld from the patient. Efforts to promote PHR use and adoption should include provider training, vender collaboration, and patient education.

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Appendix A

**Center for Research and Education on Aging and
Technology Enhancement**



Demographic and Background Questionnaire

Technical Report No. CREATE-2006-02
University of Miami
Florida State University
Georgia Institute of Technology

Sara J. Czaja
Neil Charness
Katinka Dijkstra
Arthur D. Fisk
Wendy A. Rogers
Joseph Sharit

Demographics Questionnaire

Gender: Male ☐₁ Female ☐₂

Date of Birth: ____ / ____ / ____

Age: ____

1. What is your highest level of education?

- ☐₁ No formal education
- ☐₂ Less than high school graduate
- ☐₃ High school graduate/GED
- ☐₄ Vocational training
- ☐₅ Some college/Associate's degree
- ☐₆ Bachelor's degree (BA, BS)
- ☐₇ Master's degree (or other post-graduate training)
- ☐₈ Doctoral degree (PhD, MD, EdD, DDS, JD, etc.)

2. Current marital status (check one)

- ☐₁ Single
- ☐₂ Married
- ☐₃ Separated
- ☐₄ Divorced
- ☐₅ Widowed
- ☐₆ Other (please specify) _____

3. Do you consider yourself Hispanic or Latino?

- ☐₁ Yes
- ☐₂ No

3 a. If "Yes", would you describe yourself:

- ☐₁ Cuban
- ☐₂ Mexican
- ☐₃ Puerto Rican
- ☐₄ Other (please specify) _____

4. How would you describe your primary racial group?

- ☐₁ No Primary Group
- ☐₂ White Caucasian
- ☐₃ Black/African American
- ☐₄ Asian
- ☐₅ American Indian/Alaska Native
- ☐₆ Native Hawaiian/Pacific Islander
- ☐₇ Multi-racial
- ☐₈ Other (please specify) _____

5. In which type of housing do you live?

- ☐₁ Residence hall/College dormitory
- ☐₂ House/Apartment/Condominium
- ☐₃ Senior housing (independent)
- ☐₄ Assisted living
- ☐₅ Nursing home
- ☐₆ Relative's home
- ☐₇ Other (please specify) _____

6. Which category best describes your yearly household income. Do not give the dollar amount, just check the category:

- ☐₁ Less than \$5,000
- ☐₂ \$5,000 - \$9,999
- ☐₃ \$10,000 - \$14,999
- ☐₄ \$15,000 - \$19,999
- ☐₅ \$20,000 - \$29,999
- ☐₆ \$30,000 - \$39,999
- ☐₇ \$40,000 - \$49,999
- ☐₈ \$50,000 - \$59,999
- ☐₉ \$60,000 - \$69,999
- ☐₁₀ \$70,000 - \$99,999
- ☐₁₁ \$100,000 or more
- ☐₁₂ Do not know for certain
- ☐₁₃ Do not wish to answer

7. Is English your primary language?

- ☐₁ Yes
☐₂ No

7 a. If “No”, What is your primary language? _____

8. What is your primary mode of transportation? (Check one)

- ☐₁ Drive my own vehicle
☐₂ A friend or family member takes me to places I need to go
☐₃ Transportation service provided by where I live
☐₄ Use public transportation (c.g., bus, taxi, subway, van services)

Occupational Status**9. What is your primary occupational status? (Check one)**

- ☐₁ Work full-time
☐₂ Work part-time
☐₃ Student
☐₄ Homemaker
☐₅ Retired
☐₆ Volunteer worker
☐₇ Seeking employment, laid off, etc.
☐₈ Other (please specify) _____

10. Do you currently work for pay?

- ☐₁ Yes, Full-time
☐₂ Yes, Part-time
☐₃ No

10 a. If “Yes”, what is your primary occupation? _____

If retired:

11. What was your primary occupation? _____

12. What year did you retire? _____

1. In general, would you say your health is:☐₁
Poor☐₂
Fair☐₃
Good☐₄
Very good☐₅
Excellent**2. Compared to other people your own age, would you say your health is:**☐₁
Poor☐₂
Fair☐₃
Good☐₄
Very good☐₅
Excellent**3. How satisfied are you with your present health?**☐₁
Not at all
satisfied☐₂
Not very
satisfied☐₃
Neither satisfied
nor dissatisfied☐₄
Somewhat
satisfied☐₅
Extremely
satisfied**4. How often do health problems stand in the way of your doing the things you want to do?**☐₁
Never☐₂
Seldom☐₃
Sometimes☐₄
Often☐₅
Always**5. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? Check one box for each type of activity.**

	Limited a lot ₁	Limited a little ₂	Not limited at all ₃
a. Bathing or dressing yourself			
b. Bending, kneeling, or stooping			
c. Climbing one flight of stairs			
d. Climbing several flights of stairs			
e. Lifting or carrying groceries			
f. Moderate activities , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf			
g. Vigorous activities , such as running, lifting heavy objects, or participating in strenuous sports (e.g., swimming laps)			
h. Walking more than a mile			
i. Walking one block			
j. Walking several blocks			

6. Are you on post-menopausal estrogen replacement therapy?

☐₁ Yes☐₂ No☐₃ Not applicable7. For each of the following conditions please indicate if you have ever had that condition in your life, have the condition now at this time or never had the condition. Check one box for each condition.

Condition	In your lifetime ₁	Now ₂	Never ₃
a. Arthritis			
b. Asthma or Bronchitis			
c. Cancer (other than skin cancer)			
d. Diabetes			
e. Epilepsy			
f. Heart Disease			
g. Hearing Impairment			
h. Hypertension			
i. Stroke			
j. Vision Impairment			
k. Other significant illnesses (please list)			

CES-D SCALE

INSTRUCTIONS FOR QUESTIONS: Below is a list of the ways you have felt or behaved. Please circle how often you have felt this way in the past week.

0 = Rarely or None of the Time (Less than 1 Day)

1 = Some or a Little of the Time (1 – 2 Days)

2 = Occasionally or a Moderate Amount of the Time (3 – 4 Days)

3 = Most of the Time (5 – 7 Days)

During the past week:

- | | | | | |
|--|---|---|---|---|
| 1. I was bothered by things that usually don't bother me. | 0 | 1 | 2 | 3 |
| 2. I did not feel like eating, my appetite was poor. | 0 | 1 | 2 | 3 |
| 3. I felt that I could not shake off the blues even with help from my family or friends. | 0 | 1 | 2 | 3 |
| 4. I felt that I was just as good as other people. | 0 | 1 | 2 | 3 |
| 5. I had trouble keeping my mind on what I was doing. | 0 | 1 | 2 | 3 |
| 6. I felt depressed. | 0 | 1 | 2 | 3 |
| 7. I felt that everything I did was an effort. | 0 | 1 | 2 | 3 |
| 8. I felt hopeful about the future. | 0 | 1 | 2 | 3 |
| 9. I thought my life had been a failure. | 0 | 1 | 2 | 3 |
| 10. I felt fearful. | 0 | 1 | 2 | 3 |

0 = Rarely or None of the Time (Less than 1 Day)
 1 = Some or a Little of the Time (1 – 2 Days)
 2 = Occasionally or a Moderate Amount of the Time (3 – 4 Days)
 3 = Most of the Time (5 – 7 Days)

During the past week:

11. My sleep was restless.	0	1	2	3
12. I was happy.	0	1	2	3
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3
16. I enjoyed life.	0	1	2	3
17. I had crying spells.	0	1	2	3
18. I felt sad.	0	1	2	3
19. I felt that people disliked me.	0	1	2	3
20. I could not get "going."	0	1	2	3

Computer Questionnaire 1

Please place an "X" on the appropriate response.

1. I feel comfortable with computers.

☐ 1

Strongly
agree

☐ 2

Agree

☐ 3

Neither agree
nor disagree

☐ 4

Disagree

☐ 5

Disagree
strongly

2. Learning about computers is a worthwhile and necessary subject.

☐ 1

Strongly
agree

☐ 2

Agree

☐ 3

Neither agree
nor disagree

☐ 4

Disagree

☐ 5

Disagree
strongly

3. Reading or hearing about computers would be (is) boring.

☐ 1

Strongly
agree

☐ 2

Agree

☐ 3

Neither agree
nor disagree

☐ 4

Disagree

☐ 5

Disagree
strongly

4. I know that if I worked hard to learn about computers, I could do well.

☐ 1

Strongly
agree

☐ 2

Agree

☐ 3

Neither agree
nor disagree

☐ 4

Disagree

☐ 5

Disagree
strongly

5. Computers make me nervous.

☐ 1

Strongly
agree

☐ 2

Agree

☐ 3

Neither agree
nor disagree

☐ 4

Disagree

☐ 5

Disagree
strongly

6. I don't care to know more about computers.

☐ 1

Strongly
agree

☐ 2

Agree

☐ 3

Neither agree
nor disagree

☐ 4

Disagree

☐ 5

Disagree
strongly

7. Computers would be (are) fun to use.

1

**Strongly
agree**

2

Agree

3

**Neither agree
nor disagree**

4

Disagree

5

**Disagree
strongly**

8. I don't feel confident about my ability to use a computer.

1

**Strongly
agree**

2

Agree

3

**Neither agree
nor disagree**

4

Disagree

5

**Disagree
strongly**

9. Computers are not too complicated for me to understand.

1

**Strongly
agree**

2

Agree

3

**Neither agree
nor disagree**

4

Disagree

5

**Disagree
strongly**

10. I think I am the kind of person who would learn to use a computer well.

1

**Strongly
agree**

2

Agree

3

**Neither agree
nor disagree**

4

Disagree

5

**Disagree
strongly**

11. I think I am capable of learning to use a computer.

1

**Strongly
agree**

2

Agree

3

**Neither agree
nor disagree**

4

Disagree

5

**Disagree
strongly**

12. Learning about computers is a waste of time.

1

**Strongly
agree**

2

Agree

3

**Neither agree
nor disagree**

4

Disagree

5

**Disagree
strongly**

13. Computers are confusing.

1

**Strongly
agree**

2

Agree

3

**Neither agree
nor disagree**

4

Disagree

5

**Disagree
strongly**

14. Computers make me feel dumb.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Strongly agree	Agree	Neither agree nor disagree	Disagree	Disagree strongly

15. Given a little time and training, I know I could learn to use a computer.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Strongly agree	Agree	Neither agree nor disagree	Disagree	Disagree strongly

Have you had any experience with computers?

<input type="checkbox"/> ₁ Yes	<input type="checkbox"/> ₂ No
---	--

Computer Questionnaire 2

Listed below are a series of statements that reflect the way that people feel about their experience(s) with computers. Please indicate whether you agree or disagree with each statement by placing an "X" on the appropriate response.

1. When using a computer, I prefer to learn through trial and error.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

2. In the past, computers have made my task(s) far simpler.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

3. I have generally enjoyed learning how to use computer software.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

4. In situations where I have had to learn how to use a computer system, I have found the operating manuals difficult to understand.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

5. I feel inadequate when receiving training at the computer.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

6. I usually get frustrated when using a computer.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

7. In the past I have felt anxious when required to use certain software.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

8. I am reluctant to ask for help when using a computer.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

9. I enjoy exploring new applications/uses for the computer or software.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

10. Other people seem to be more skillful at using a computer than myself.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

11. I usually get frustrated when using certain software.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

12. From past experience, I would prefer to learn a new computer software package on my own.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

13. I am usually curious to use the latest version computer software.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

14. Computer support staff talk in computer jargon with which I am unfamiliar.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

15. I have not received sufficient training at the computer.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

16. Instead of asking for assistance with a computer-related problem, I prefer to try and solve it myself.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

17. When seeking advice from computer support staff (technician), I am often unable to state clearly what my query or question is about.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

18. I often feel scared when using a computer.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

19. When I seek advice about a computer-related question, I feel stupid when I am told that the answer is simple.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

20. I often feel concerned that I might do damage to the computer if I make a mistake.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

21. I feel incompetent when having to ask for computer assistance.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

22. The training I have received in computer usage has been very beneficial.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

23. When I cannot understand how to use computer software, I evaluate my own performance in a negative way.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

24. I feel quite powerless when I am being instructed to use a computer or computer software for the first time.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

25. In the past, computer education has facilitated my understanding of computer software capabilities.

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> N/A
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

26. In the past, I have had insufficient time at work to learn to use computer software.

<div>1</div>	<div>2</div>	<div>3</div>	<div>4</div>	<div>5</div>	<div>N/A</div>
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

27. I often feel isolated from other people when using a computer.

<div>1</div>	<div>2</div>	<div>3</div>	<div>4</div>	<div>5</div>	<div>N/A</div>
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

28. Most computer manuals need to be read from front to back to be understood.

<div>1</div>	<div>2</div>	<div>3</div>	<div>4</div>	<div>5</div>	<div>N/A</div>
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

29. In the past, computer training has improved my ability to use computer software.

<div>1</div>	<div>2</div>	<div>3</div>	<div>4</div>	<div>5</div>	<div>N/A</div>
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable


30. I feel more at ease using a computer when alone than with a group of people.

<div>1</div>	<div>2</div>	<div>3</div>	<div>4</div>	<div>5</div>	<div>N/A</div>
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

31. When I encounter a computer-related problem that I cannot resolve myself, I feel comfortable about asking an expert.

<div>1</div>	<div>2</div>	<div>3</div>	<div>4</div>	<div>5</div>	<div>N/A</div>
Strongly disagree	Mostly disagree	Uncertain	Mostly agree	Strongly agree	Not applicable

Appendix B

**GEORGIA**
COLLEGE
GEORGIA'S PUBLIC LIBERAL ARTS UNIVERSITY

IRB Portal

HomeApplications

Home

Application #431 "PHR Use"

ViewRevision operations

Your IRB approval will expire on 2016-03-06 12:43:51. If you wish to continue your research, you will need to request a renewal.

Start a renewal application now

ApplicationDocumentsProgress

title: "PHR Use"

Status: **Approved** state set by whitney.heppner... on 2015-03-06 (previously **With Moderator**)

Exempt

No

Extension

No

Principal Investigator (PI)

Imke Casey
imke.casey@bobcats.gcsu.edu
School of Nursing
Student - Dissertation
[REDACTED]
([REDACTED])
NIH/CITI certification: Yes, Thursday, May 15, 2014
View Certificate:

Appendix C

Georgia College & State University Consent Form

I, _____, agree to participate in this “Personal Health Record Use” research. Imke Casey is the investigator. She is a Doctor of Nursing Practice student at Georgia College and State University. I understand this participation is voluntary. I can withdraw my consent at any time. If I withdraw my consent, the results of my participation will be returned to me, removed from the research records, or destroyed.

The following points have been explained to me:

1. Purpose of this research.

- To study the use of the *patient portal*

Only ten percent of all US patients use the *patient portal*, an internet-based personal health record. Your physician is offering the *patient portal* to all patients because patients who have access to their health information have been linked to better health outcomes.

2. Participants. If you volunteer to participate in this study, you will help us to find out how patients use the patient portal after a ten-minute training session. You are asked to participate in this study because:

- you are 40-85 years of age
- have a chronic condition
- are a patient of a primary care practice
- speak English fluently

3. Procedures. If you volunteer to participate in this study, you will be asked to do the following:

- Answer questions during an interview. I will ask you questions about your personal background including your education, income, health, and computer use.
 - Your answers will be audio recorded and written down on a piece of paper.
 - Your name is noted only on the consent to the study that you sign.
 - The information gathered will be completely anonymous and untraceable, except for the researcher.
- Next, you will participate in a training session. You will learn how to use the *patient portal*.
- Finally, I will call you four weeks after your training session. I will ask you several questions about the *patient portal* and how you have used it. Your answers will be audio recorded and written down on a piece of paper.
- In total, it will take about 40 minutes of your time. As a thank you for your time, you will receive two small tokens of appreciation.
 - After you participate in the training session, you will receive a refrigerator magnet with a calendar as a reminder that I will call you in four weeks for a ten-minute follow-up telephone interview.
 - Upon completion of the telephone interview, I will mail you a \$5 merchant gift card.

4. **Benefits of Participation.** Possible direct or immediate benefits of participating in this study may include:
 - Better understand how to access and use your health information.
 - Better self-manage your condition
 - Better communicate with your primary care provider.
 - Better keep track of your prescription medication
5. **Risks of Participation.** This study has minimal risks. Some interview questions are personal and intrusive. After the interview and training session you may be tired. You can stop, rest, or reschedule the interview and/or training session at any time. You will not endure any distress or pain during the study. No physical, psychological, social, or legal risks exist in this study.
6. **Cost or Compensation.** There is no cost to you. The study will take approximately 40 minutes. You will not be compensated for your time. You will receive two small tokens: a magnet calendar at the end of the training session and a \$5 merchant gift card after the phone interview.
7. **Contact Information.** You can call Imke Casey at [REDACTED] or Professor Jeanne Sewell at [REDACTED] if you have with questions about the study. For questions about your rights as a research participant contact the University Office for the Protection of Research Subjects at (478) 445-1795. Call this number also if you have complaints about the study or how it is conducted.
8. **Voluntary Participation.** Your participation in this study is voluntary. You can refuse to participate in this study. You can withdraw at any time without prejudice to your relationships with your primary care provider, your primary care clinic or the university. You are encouraged to ask questions about the study at the beginning or at any time during the research study.
9. **Confidentiality.** All information will be kept completely confidential. No reference will be made that could link you to this study. The results of this participation will be anonymous. The results will not be released in any individually identifiable form without your consent unless required by law. All records will be kept in a locked area for three years. After the storage time, the information will be shredded and destroyed. A secure web server will be used to deliver and analyze the questionnaire information.
10. Results of the study will be provided at the completion of the research project, at your request.

Signature of Researcher

Date

Signature of Participant

Date