Patient Portal Use in a Community Medical Group: A Healthcare Improvement Project

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PATIENT PORTAL USE IN A COMMUNITY MEDICAL GROUP:

A HEALTHCARE IMPROVEMENT PROJECT

BY

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DISSERTATION

Submitted to the University of New Hampshire

In Partial Fulfillment of

The Requirements for the Degree of

Doctor of Nursing Practice

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College of Health and Human Services  
Department of Nursing  

Final Approval of DNP Project  
Doctor of Nursing Practice  

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Title of DNP Project: Patient Portal Use in a Community Medical Group: A Healthcare Improvement Project  

In partial fulfillment of the requirements for the degree of  
Doctor of Nursing Practice in the  
DNP Program  

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May 18, 2016
DEDICATION

This would never have been possible without the support of my family and friends and I dedicate this doctoral project to them.

To my husband and best friend, Dan for the love and endless support. What a wild ride this has been and I couldn’t have made it without you by my side.

To my daughter Amy, who after completing her doctorate said, “It’s your turn, Mom.” Her belief in my abilities led me to seriously consider the pursuit of this dream.

To my son Sam, who kept my spirits up with words of encouragement and provided timely comic relief to alleviate my stress.

To my daughter Julia, who knew when a hike or a girls’ day was desperately needed.

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ABSTRACT

PATIENT PORTAL USE IN A COMMUNITY MEDICAL GROUP: A HEALTHCARE IMPROVEMENT PROJECT

By

Pamela S. Kallmerten

University of New Hampshire, May, 2016

The American Recovery and Reinvestment Act (ARRA) of 2009 included the Health Information Technology for Economic and Clinical Health Act (HITECH) to provide stimulus for the provision of electronic access for consumers as a way to improve patient engagement. As described by the act, meaningful use of a tethered personal health record called a patient portal was theorized to improve patient engagement and result in improved clinical outcomes, reduced cost and increased patient satisfaction. Accordingly, financial incentives and penalties were to be awarded the eligible provider (EP) demonstrating meaningful use according to various stages with corresponding deadlines. A community medical group is striving to receive the financial incentives for meaningful use as well as address the national initiatives to improve patient engagement with the use of a patient portal.

The global aim of this two part research translation and healthcare improvement project is to promote patient engagement by identifying the factors that affect a patients’ decision to use a patient portal as well as to identify potential strategies to promote portal use. Phase I of the project involved surveying both patient portal users (n=235) and non-users (n=36) to determine the presence of any barriers or facilitators. The survey was based on the Health Information
Technology Acceptance Model by Kim and Park (2012). In addition, baseline patient engagement was assessed using the *Patient Activation Measure* (PAM®). When comparing portal users to non-users with respect to the HITAM model variables, differences were identified in the perception of usefulness as well as the related outcomes of attitude and intent to use the technology. In addition, if a patient perceives that the patient portal is useful, they are 1.44 times more likely to register and use a patient portal. There were no differences in patient engagement levels between portal users and non-users.

In Phase II, the data analysis guided the selection of an intervention, a pilot of *Open Notes* by volunteer community medical group providers as a strategy to possibly increase the percentage of patients who access and use the patient portal. Patient perceptions as to benefits and risks of viewing their office visit note will guide facility decisions to optimize portal use.

*Key Words:* patient portal, meaningful use, patient engagement, healthcare improvement
INTRODUCTION

Patient engagement has been identified by the Institute of Healthcare Improvement (IHI) in their Triple Aim Initiative as a way to improve the patient experience and outcomes to improve the quality of care. In 2009, the American Recovery and Reinvestment Act (ARRA) which included the Health information Technology for Economic and Clinical Health (HITECH) Act was passed to promote the adoption and meaningful use of health information technology. As described by the act, the meaningful use (MU) of a tethered personal health record called a patient portal was theorized to improve patient engagement and result in improved clinical outcomes, reduced cost of care and increased patient satisfaction by providing patients with their personal health information in an electronic format.

Many organizations are striving to improve patient engagement as well as receive the financial incentives for meaningful use of the patient portal. Yet a relatively small percentage of patients register and use a patient portal. A review of the literature shows that there are many factors that may impact the patients’ perception of usefulness and ease of use of the technology. These perceptions lead to a positive or negative attitude that influences the intent to use the patient portal. Without portal use, the promise of enhanced patient engagement may be unrealized.

A community health care organization created a patient portal nearly four years ago with the intent of improving patient engagement as well as attesting to the federal guidelines for meaningful use. Despite improvements to the patient portal, utilization rates remain low. The global aim of this two part research translation and healthcare improvement project is to promote patient engagement by identifying the factors that affect a patient’s intention and decision to use
a patient portal as well as to identify potential strategies to promote portal use. The specific aim is to implement an evidence-based intervention into clinical practice to increase the percentage of the organization’s patients who register to use the patient portal from baseline to the benchmark of >50%.
I: BACKGROUND

Context

Concord Regional Health Care encompasses both Concord Hospital Medical Group (CHMG) and Concord Hospital (CH). CHMG has 255+ primary and specialty providers with 18 subspecialties in 28 locations in central New Hampshire. Their patient portal, Patient Connect-My CHMG Health Care was developed in 2011 and improved in 2013. Currently, the Centricity Electronic Medical Record (EMR) platform is used for the CHMG patients. Additionally, Concord Hospital has a patient portal for patients requiring hospitalization called Patient Connect-My Concord Hospital Stay. This patient portal is supported by a separate EMR platform. However, the facility is currently transitioning to an enterprise-wide EMR which will offer one patient portal to patients who are cared for in the inpatient or outpatient setting.

The charter for the CHMG strives for congruency with the mission of CH as part of Concord Regional Health Care and is described as being a charitable organization serving the health needs of individuals within the community while the vision is to serve patients and their families. CHMG has formed an operations committee consisting of providers, informatics specialists, and representatives from the clinical team. This team, the Patient Connect Operations Committee, was formed to provide guidance and support for the facility’s population health endeavors through the use of the patient portal to support patient engagement.

Problem Description

Like many organizations striving to improve patient engagement, CHMG developed their patient portal in response to the HITECH act. Patient access into the portal would enable the organization to realize potentially improved patient outcomes as well as the
financial benefits for Meaningful Use (MU). Initially, a focus group with patient representatives was conducted to gather feedback used to create the first version of the patient portal. Initial marketing for the patient portal was conducted, the first patients were registered and utilization of the patient portal began. The first version of the patient portal included access to administrative functions such as the ability to request an appointment or referral, send an email through the secure messaging system (SMS) and the ability to pay their provider bill online. In addition, the patients were provided access to their diagnosis, problem list, medication list, allergies and patient education resources. To attest to MU Stage I, at least 10% of all unique patients seen by an eligible provider are provided timely electronic access to their health information meeting the core measures noted. While the facility was able to attest to MU Stage I, the facility goal was to strive to attain MU Stage II with at least half of their patients completing portal registration. Percentages of patient use were still below benchmarks after several years and the portal was improved to include access to limited laboratory results, vital signs, immunizations, enhanced patient educational materials as well as provide for family management. However, nearly four years later, low portal use remain a concern.

In a report generated by the Chief Medical Information Officer (CMIO) in early 2015, only 17,227 of the 78,055 patients or 22.07% had registered for the patient portal. The CHMG addressed this concern as well as the additional requirements of the second stage of MU which would include attestation to bi-directional communication and evidence that >5% of the patients were using the patient portal to view, download and transmit information. The challenge was presented to the CHMG practices to continue robust enrollment of patients into Patient Connect with the goal to register an additional 1000 patients per month toward the facility benchmark of >50% portal registrations and use.
The problem of underutilization was impacted by a lack of a thorough understanding of the reasons why the patients were not registering and using the patient portal. Although a focus group guided initial creation of the first version of the portal, a survey of patients regarding the access needs was not conducted as planned. Without an understanding of the influential factors impacting the intention and decision to use a patient portal, optimal patient engagement may be compromised.

Available Knowledge

The literature review started with the formulation of the question: what are the effects of the use of a patient portal toward patient engagement? The review was complex as the term patient portal was also used interchangeably with other terms such as personal health record and the term patient engagement is used interchangeably with other related concepts. In the review of the literature regarding patient engagement, the related concepts of patient activation, patient empowerment, patient participation, patient adherence, patient involvement and patient acceptance were noted. A locus of patient centered care was preferred and as such the concepts of patient participation, adherence, involvement and acceptance were discarded as concepts of interest as being more provider-centric. The concepts of patient activation, engagement and empowerment were included in the literature search.

Search Strategy

Initially, the Boolean/Phrase of patient portal was used in the search due to the fact that a MeSH term “patient portal” did not exist. Thus patient portal$ AND patient engagement OR patient activation OR patient empowerment were the keywords used in the initial search. The search was conducted using the Ebsco host search engine and the databases included Medline, Cumulative Index to Nursing and Allied Health (CINAHL) complete, Cochrane Central Register
of Controlled Trials, Cochrane Database of Systematic Reviews, Health Technology Assessments and Health Source: Nursing/Academic Edition. Limiters for the years 2005-2015, adults>18 years, and peer reviewed journals were selected. This initial search provided 802 results with all except 61 of them rejected due to inclusion of articles relating to portal vein or portal hypertension rather than patient portal.

To discover other potentially useful literature a review of the MeSH terms that might be applicable revealed other terms for a patient portal including the personal health record (PHR). Initially, the Electronic Health Record or (EHR) was a term for the platform used by the healthcare provider for documentation of care. In today’s electronic world the EHR has replaced the paper chart for many institutions. Documents and data stored in the EHR can be given to the patient upon request but the record containing the information belongs to the provider.

The Personal Health Record was the term for the platform that a patient used to record their information for personal use. In today’s electronic world, the PHR has replaced paper diaries and copies of forms that a patient would use and store to record personal health information. The PHR can be a standalone system kept within a personal computer or stored in a website maintained by the patient. This system is often referred to as a non-tethered PHR as the data is not shared with the provider unless the patient chooses to do so. By contrast, a patient portal is considered a tethered PHR. The data is maintained in a shared web site and accessible to both the patient and the provider and is tethered to the EHR.

To fully identify all literature on the topic, this search was expanded to include the MeSH terms of personal medical records OR internet utilization OR computerized patient record OR electronic health record OR patient access to records OR personal health records AND patient engagement OR patient activation OR patient empowerment. This search produced 2,485 results.
and most were excluded for addressing the proxy use of the PHR by the parent or spouse of a patient, the inpatient rather than the outpatient setting, and the provider rather than the patient perspective. This search revealed an additional 63 articles that were retrieved for full text review.

Finally, an author search was conducted if an author had published more than two papers on the topic. Several authors were searched including E. Ammenwerth, D.S. Wakefield, C.S. Kruse, M. Goel, L. A. Volk and others. The author search resulted in 5 additional articles for full text review. As most of the articles had been published in two specific journals, hand searching was conducted for the Journal of Medical Internet Research (JMIR) and the Journal of the American Medical Informatics Association (JAMIA) discovering fifteen and thirteen additional articles respectively for full text review. Lastly, bibliographic review and hand searching revealed an additional eight articles.

All retrieved articles were obtained including the use of the Iliad intra-library loan process and read for data extraction and synthesis. As with the abstract screening process, the articles were appraised for the fit with the question: Does the use of the patient portal impact patient engagement?

**Conceptual Framework**

A review of the literature identified many theoretical frameworks in the use of technology to improve patient care in the outpatient setting. The most frequently used framework to describe consumer use of technology is the Technology Acceptance Model (TAM) or one of the many revisions (TAM2, TAM 3). Most of these were devised to address the healthcare workers use and one of the constructs is that of job relevance. Thus, TAM and the revised versions were not suitable for this project. Another model derived from TAM is the
Information and Communication Acceptance Model (ICTAM) that focused on the consumers’ use of the internet. This project explored the use of a web-based tethered PHR also known as the patient portal, and the use of ICTAM was considered. However, the patient portal encompasses more than internet links, specifically, the viewing, downloading and transmitting (VDT) of information and the sending of secure messages (SMS). The Theory of Planned Behavior (TPB) was considered as it encompassed key variables such as beliefs, subjective norms, attitude and intention that lead to a change in behavior. However, it did not specifically address the technological aspects of the project. Therefore, the best fit for this project was determined to be the Health Information Technology Acceptance Model (HITAM).

This model was developed by Kim and Park (2012) as an extension of TAM that incorporated constructs from the TPB as well as those of the Health Belief Model (HBM). The authors “categorized the influential factors affecting the behavioral intention to measure, store, and manage health-related data into three domains called the health zone, information zone and the technology zone” (Kim & Park, 2012, p. 11). Within the health zone are constructs from the TPB (behavioral beliefs) as well as the HBM (health status, health belief and concerns and perceived threat). Within the information zone are constructs from the TPB (normative beliefs and subjective norm). Lastly, within the technology zone are constructs from the TPB (efficacy beliefs) and TAM (HIT reliability and self- efficacy, perceived usefulness and ease of use). These antecedents and mediating processes can impact the attitudes that generate behavioral intentions and lead to a change in behavior.
Rationale

Using Kim and Park’s Health Information Technology Acceptance Model (HITAM) as a framework for data extraction and synthesis will facilitate identification of the patient factors that impact use of the patient portal and consequently patient engagement. As previously discussed, the authors “categorized the influential factors affecting the intention to measure, store and manage health-related data into three domains called the health zone, information zone and technology zone” (Kim & Park, 2012, p. 11).

In the Health Zone, the patients’ behavioral beliefs, health belief and concerns, and health status are mediated by the perceived threat to health. Drawing on the TPB, behavioral beliefs are reflective of outcome valuations. Many authors have identified a perceived value in the use of the patient portal or personal health record as a facilitator. One group described this perception
of value as meaningfulness which is one of four cognitive dimensions of patient empowerment (Riva, Camerini, Allam, & Schultz, 2014). Another group described the perception of value in terms of whether or not the patient was interested in the use of a patient web portal (Ronda, Dijkhorst, Gorter, Beulens, & Rutten, 2013). Preconceived beliefs and values regarding the use of the secure messaging system (SMS) within the patient portal were reported to be a barrier to the use of the portal (Wade-Vuturo, Mayberry, & Osborn, 2013).

Antecedents to the identification of a perceived threat include health status (age and disease including chronic conditions and comorbid conditions) and health belief and concerns. The results of the literature review are mixed when it comes to whether or not age is a factor affecting portal use. An inverse relationship between age and patient portal use was noted by six groups. Two research groups noted advanced age as a barrier with particular attention to the age group over 70 years of age. Additionally, two other research groups also noted an inverse relationship to age and portal use with younger patients using the portal more than older patients, while three researchers found that the younger the patient the decrease in patient portal use. An explanation for this effect is related to the perception of threat and a limited number of chronic conditions that eradicate the need for portal use. The remainder of the research does not support age as either a barrier or facilitator of portal use. Regarding the conception of advanced age as a barrier one group reported that “one third of patients in their sixties and one fourth of patients in their seventies had signed up for the personal health record and found it to be valuable” (Emani et al., 2012, p. 10).

Almost all of the researchers found that there was a relationship between the increasing number of chronic conditions and an increased use of the patient portal. As patients face increasingly complex self-management situations, their use of the administrative functions of
the patient portal, such as the medication refill function, increases. They also report viewing, downloading and transmitting their personal health information such as laboratory results and sending secure messages (email) to their provider’s office. Two teams found that with extremes of the number of chronic conditions and disease states, the likelihood of portal use declines (Neuner, Fedders, Caravella, Bradford, & Schapira, 2015 and Weingart, Rind, Tofias, & Sands, 2006).

Other health status conditions that impact portal use include physical, cognitive or perceptual impairment. For example, Nielsen, Halamka, & Kinkel (2012) found that an increase in upper extremity disability in those afflicted with Multiple Sclerosis led to a decrease in portal use and Shimada et al. (2014) found that sequela following a Cerebral Vascular Accident limited use in the Veteran’s Administration patient population. Taha, Sharit, & Czaja (2014) found that an increase in numeracy problems in the older adult population led to a decrease in portal use.

Drawing from concepts in the Health Belief Model, health beliefs and concerns are also antecedents impacting the perceived threat. These provide the psychological incentives as mediating processes. Otte-Trojel, De Bont, Rundell, & Van de Klundert (2014) described patient insight as one of four mechanisms by which patient portals impact outcomes. Illness ownership was determined to be a facilitator to portal use by Winkelman et al (2005). “Health belief and concerns may motivate people to take action toward their health management” (Kim & Park, 2012, p. 11). Motivation was addressed by several researchers including Goel et al (2011) who reported that lack of motivation was a barrier to portal use.

In the Information Zone, normative beliefs and motivation to comply impact subjective norms. These antecedents of social pressure or influence and competition within the community impact whether or not the patient perceives that the use of the patient portal is useful. Many of
the researchers addressed socioeconomic status with universal agreement that economic
concerns, income and access to both a computer and the internet impact portal use. Referred to
by many as the digital divide or social divide, increased income and having private insurance
were found to be facilitators to portal use while a decreased income and public insurance were
noted to be barriers to portal use. Additionally, all of the research suggests that higher education
is associated with an increased likelihood of portal use and for those with limited education;
portal use is not as prevalent. More than a dozen researchers also noted that persons who
identified themselves as white or Caucasian were more likely to use a patient portal as compared
to non-white leading to agreement that there exists a disparity for ethnicity regarding patient
portal use. Regarding the impact of gender on patient portal use, the results are mixed with some
research teams reporting that men were more likely to use the portal, a few reporting that women
were more likely and most stating that there is no consistent effect.

A related concept within the subjective norm category is that of the relationship with the
provider with recurrent themes of effects on communication and trust. Lyles et al. (2013), like
most of the other researchers, found that as perceptions of trust and communication with the
provider increased, so too did use of the patient portal. Likewise, Ronda et al (2013) found that
in the absence of provider support, patients did not use the portal.

The perceptions of social support within the community also had implications for patient
portal use. Winkelman et al (2005) found that a perception of diminished social support was a
barrier to patient portal use and others found that there were many social factors that were
associated with the acceptance of consumer HIT.

The fourth antecedent is termed HIT reliability and addresses concerns that patients’ have
regarding security, privacy and functionality to answer the question: Is the system reliable, safe,
and secure? Difficulties with the patient portal itself include the inability to obtain information in a timely manner including laboratory results and email responses to patient-generated queries. Several patients have privacy and security concerns especially with conditions for which there is a perception of stigma. Much of the research addresses this by way of exploring the outcome of reported patient satisfaction with the patient portal. Patients reported a disinterest in using the patient portal secondary to a decreased satisfaction with the experience (Zickmund et al., 2008). Overall, the reliability of the patient portal is perceived as a facilitator to patient use and unreliability is felt to be a barrier to use.

Finally, the Technology Zone is addressed, comprised of efficacy beliefs impacting HIT self-efficacy. Within the construct of HIT self-efficacy lie perceptions of HIT anxiety, HIT playfulness, perceived enjoyment, and objective usability. In other words, does the patient perceive that they have the computer skills and eHealth literacy skills in addition to the confidence in using the technology? Are these skills readily observed by others? Wakefield et al., (2012) reported that overall use will involve a period of adjustment. Taha et al., (2014) reported that older adults were not only disproportionately affected by lower health literacy but also tend to overestimate their correlational abilities. Ronda et al., (2013) reported a finding of decreased computer literacy as a barrier to self-efficacy. Many researchers explored the outcome of eHealth literacy with many choosing to measure it with the eHeals tool while others used a variety of computer literacy or eHealth literacy instruments. Although mentioned earlier as a component of HIT reliability, patient satisfaction can be reflective of the human-technology interaction and can be tied to HIT self-efficacy as well. Patients may or may not perceive enjoyment with the use of the portal or whether the use generates a perception of HIT related anxiety.
The mediating processes of perceived threat, usefulness and ease of use affect the patient’s attitude toward the use of the patient portal. At least two research teams identified attitudes as factors impacting use. Goel et al., (2011) found that negative portal attitudes were a barrier to patient use as did the team conducting a systematic review of electronic patient portals (Goldzweig et al., 2013). It is the positive attitude that generates the behavioral intention to actually use the patient portal because the patient decides the use is beneficial and satisfying. This behavioral intention can be addressed by the patient’s willingness and intent to regularly and continually use the portal as well as recommend it to others. This meaningful use has been studied as enhancing patient engagement, activation or participation toward patient empowerment. The global aim of this two part research translation and healthcare improvement project is to promote patient engagement by identifying the factors that affect a patient’s intention and decision to use a patient portal as well as to identify potential strategies to promote portal use. The specific aim is to implement an evidence-based intervention into clinical practice to increase the percentage of the organization’s patients who register to use the patient portal from baseline to the benchmark of >50%.
II: METHODS

Healthcare Improvement Methodology

The Define, Measure, Analyze, Improve and Control (DMAIC) methodology (Moore and Stichler, 2015), guided this Doctorate of Nursing Practice (DNP) project. In the first stage, problem definition occurs including the determination of the project goals. A thorough review of the literature and the selection of a theoretical or conceptual framework to guide the project is also conducted during this stage. In the measure stage, the current state is reviewed and key performance indicators are determined. The methods to explore the problem are also determined in this stage with attention to the selection of valid and reliable instruments. Analysis of the information obtained during the measurement stage will be used to guide the selection and implementation of an intervention that has the highest potential for an improvement. Finally, the control phase will measure the impact of the intervention and recommend a plan for sustainability.

Measures: Phase I

After UNH Institutional Review Board (IRB) and CH Human Investigations Committee (HIC) approvals, phase I of the practice proposal entailed the administration of a questionnaire based on one developed by Kim and Park using the Health Information Technology Acceptance Model (HITAM). The original survey, “A questionnaire on Development of a Health Information Technology Acceptance Model” was furnished by the authors for review and possible inclusion in the practice proposal. This questionnaire included multiple choice, multiple response and Likert-type questions. The authors conducted psychometric testing including soliciting a group of HIT experts to ascertain content validity and a Cronbach’s alpha rating of
0.853 was reported for reliability (Kim & Park, 2012). The original survey was developed for the Korean population to survey internet and portal use in health management. With the authors’ permission, the questionnaire was modified for the adult population (over age 18 years of age) who are patients served by the CHMG and use information technology (IT) in their health management. For example, substitutions included the income to reflect the dollar as currency and the phrase “development of a chronic disease” rather than the “attack of chronic disease” to reflect the English language rather than Korean translation into English. Additions included the initial question as to whether or not the patient was a current registered user of Patient Connect for comparison of users and non-users as well as race to determine any disparity to patient portal use (Appendix A).

The second measure includes the administration of the Patient Activation Measure (PAM®) developed to provide an evidence-based measure of patient engagement at baseline. The Patient Activation Measure (PAM®) is a ten item Likert-style survey to assess patient activation (Appendix B). Patient activation or engagement has been noted to improve clinical outcomes, patient satisfaction and safe care. The chief executive officer of Insigna Health was consulted regarding a research license for the use of the PAM® and administration via the Qualtrics survey. The PAM® instrument was reviewed by an expert panel for face and content validity. A Cronbach’s Alpha rating of 0.87 attests to the reliability of the instrument (Hibbard, Stockard, Mahoney, & Tusler, 2004).

Using the University of New Hampshire (UNH) site license for Qualtrics Survey Research Suite, the questionnaire on use of the patient portal was created which incorporated the adapted HITAM survey, the PAM® questions and the consent letter. The UNH consent letter template was used to create the consent form for the adult (over age 18) population. The
HITAM survey and the consent letter were modified based on recommendations from the CH Human Investigations Committee (HIC) to reflect an 8th grade reading level. Revisions and evaluation led to the new survey, Patient Connect-My CHMG Survey, receiving a Flesch-Kincaid grade level assessment of 7.5. The survey was piloted by volunteers of the CHMG patient panel selected by the CH Human Investigations Committee.

The first screen provided was the informed consent letter verifying that they were an adult over the age of 18 years, a current patient of a CHMG practice and that consent was given. The introductory consent letter includes a rationale for the collection of this data (Appendix C). The participant was also informed that the Qualtrics Research Survey Suite includes a feature providing for the anonymity of the responses. By selecting the anonymize response option during the creation of the survey, personal information was not recorded and panel associations were removed. If the survey participant selected an affirmative response to the consent, the second question was presented and if a denial for consent was given, the participant was taken to the end of the survey and appreciation of thanks by the use of “skip logic”.

Question two asked whether or not the patient had registered for the patient portal. This response was crucial to the data analysis phase to determine the potential barriers and facilitators that are perceived to be influential factors in the decision to use a patient portal. If a response was not given, an alert was triggered to “force” a response. At any time, the participant could leave the survey and discontinue participation. The remaining questions addressed the combined HITAM survey and the PAM® instrument to assess baseline patient activation or engagement.

The electronic survey link was sent by a CHMG representative to patients who had provided an electronic mail (e-mail) address. The survey link was operational through any
technological device including a desktop or laptop computer, a tablet computer or a smartphone (Figure 2.1).

![Patient Connect-My CHMG Survey via smartphone device](image)

**Figure 2.1 Patient Connect-My CHMG Survey via smartphone device**

To gather input from those patients who have not shared an e-mail account, the *Qualtrics* link was also provided to CHMG patients during the sampling time frame by a “lite box” pop up on the Concord Hospital web site (Figure 2.2). During Phase I, the *Qualtrics* survey link was active until December 16, 2015.
**Ethical Considerations**

Ethical issues necessitating protection of human subjects include privacy and security concerns with personal health information. This project was reviewed and approved by the UNH Institutional Review Board (Appendix D) as well as the CH Human Investigations Committee (Appendix E). In addition, consultation with the CH privacy and security manager and committee was conducted to address any additional concerns. Questions required to identify barriers and facilitators as well as disparities in patient portal use include demographic information such as age, race, gender, educational background and income. These questions may be perceived as sensitive issues and raise questions as to why the information is necessary. Most of the survey responses in Phase I were requested rather than a forced response allowing
the participant to decline to answer any question. The exceptions to this were for the first two questions addressing informed consent and patient portal use.

**Analysis: Phase I**

The *Qualtrics* survey based on HITAM including the PAM® questions was closed on December 16, 2015. The data was uploaded into an excel spreadsheet and then into *JMP Pro 12 Discovery Software* for analysis. There were 366 total responses with 271 complete surveys for analysis. After eliminating the missing data, variables were recoded for analysis. For example, age was recoded as 1 to represent a patient who was either 18 or 19 years of age with 2 selected to represent a patient in their twenties and so on. Initially, question 5 for race was set up as a select all that apply type of question. However, on review the survey respondents did not select more than one race so 1 represented white/Caucasian, 2 represented black or African American, etc. Education was also recoded as 1 for less than a high school degree, 2 for HS degree or GED equivalent, etc. Questions representing a particular HITAM concept were summed and entered into the data base as interval level scores for entry into inferential statistical procedures. The summative scores consist of adding the subjects’ selections. For example, subjects’ selections ranging from 1 to 5 points for five questions or 25 points total.

General characteristics were described using frequency distribution and percentages. Pareto charts were created for the select all that apply questions. The answers to the PAM® questions were uploaded into an excel spreadsheet provided by Insigna Health which calculated an engagement score as well as an engagement level ranging from Level 1 to Level 4.

Because the sample sizes were not equally representative in the total sample, with 36 non-users and 235 portal users, a matched cohort procedure based on general characteristics
including gender, age, race, education, presence of a chronic condition and income. This procedure resulted in an equal number of 36 users and non-users with an 80% exact match and a 20% matched with all except for one demographic variable. This data was uploaded into the *JMP Pro 12 Discovery Software* to determine with a *t*-test analysis any differences that may exist.

Finally, logistic regression analysis was applied to determine the presence of any predictors of portal use. The mediating processes of perceived threat (susceptibility and seriousness), perceived usefulness or perceived ease of use were factors and their interactions were entered into the logistic regression procedure.

**Intervention: Phase II**

Based on the survey results, the implementation of the release of the office visit note using the evidence-based process called *Open Notes* was selected as a potential strategy to potentially increase patient portal use and optimize patient engagement. *Open Notes* is a national initiative to provide the office visit note to patients through the secure access of the patient portal. The initiative was initially supported by a grant from the Robert Wood Johnson Foundation championed by Beth Israel Deaconess Medical Center (BIDMC) in Boston, Geisinger Health in Pennsylvania and Harborview Medical Center in Seattle, Washington. Currently, more than 6 million patients nationwide have access to their doctor’s notes (www.opennotes.org). The literature suggests that the use of a patient portal to provide the office visit note provided many benefits to patients and providers including improved patient-provider relationships, improved communication, enhanced safety and improved clinical outcomes (Delbanco et al, 2012).
Six CHMG providers volunteered to trial the use of Open Notes for their patients who were registered users of the patient portal. The remainder of the team involved in the implementation of phase two included the CHMG information technology (IT) specialists to address the current platform functionality to release the office visit note and the clinical team including the registered nurse practice managers, clinical leaders and the office medical assistants.

The team at BIDMC was consulted and many resources were obtained to implement Open Notes including pre and post implementation surveys for patients and providers, patient and clinician frequently asked questions (FAQs), a guide for providers on how to write fully transparent notes, and sample questions to be addressed in determining site specific pilot procedures. The documents were revised to address CHMG concerns and presented to several CHMG members including the Informatics Committee and the CHMG Practice Managers meeting. On site meetings with each volunteer provider and clinical team were conducted to provide education and to answer questions. The educational documents were sent to the team electronically as well as a step-by-step reference guide detailing the patient view (Appendix F).

To address the aim of increasing the percentage of registered portal users and improving patient engagement, a flyer was created and printed detailing the pilot program. If a patient who was not currently a registered user of the patient portal expressed an interest in the opportunity to read the office visit summary, a temporary personal identification number was provided at the time of the encounter. The patient could then receive the office visit note, the patient FAQs, and the post-intervention survey which included the PAM® instrument (Appendix G).
Study of the Intervention: Phase II

Before the implementation, baseline data for the volunteer providers regarding attestation to MU Stage II was obtained including the total number of patients and the number of registered portal users in the panel as well as the percentage of registered users. This data will be compared to the percentage of registered users at one, three and six months. The Qualtrics survey for the CHMG patients of the pilot providers that was based on the BIDMC patient post implementation survey will also be analyzed using the JMP Pro 12 Discovery Software. The patients’ perceptions of benefits and risks to reading office visit notes as well as whether or not the availability of the office visit note would impact the decision to use a provider will be analyzed.
III: RESULTS

Results: Phase I Descriptive Statistics

The first section of the survey contained information regarding portal use and general characteristics. Nearly eighty-seven percent of the survey participants identified themselves as portal users (n=235) while only thirteen percent did not (n=36). While the target sample size of 222 total and 111 portal users was met, the minimum number of 111 non-users was not met for an a priori medium effect size for hypothesis testing. Eighty-seven percent of the participants’ were female and thirteen were male. The majority (37%) were in the 50-59 years age bracket. The majority (96%) identified themselves as white/Caucasian. The majority (59%) held at least a bachelor’s degree. While 38 percent stated that they had not managed a personal chronic disease, sixty-two percent had managed at least one chronic disease. Lastly, the majority (44%) of the respondents stated that their yearly household income was greater than $100,000 on average. Complete demographic data gathered in the first section of the survey, general characteristics, are noted in Table 3.1.

When analyzing the types of personal chronic disease that the CHMG patients are managing, a wide variety is noted (Figure 3.1). The category of ‘other’ included an open ended item where the opportunity to specify a chronic disease could be noted. Other chronic disorders reported included gastrointestinal disease such as celiac disease and gluten intolerance, gastroesophageal reflux disorder, and irritable bowel disease. Another frequent free text entry included thyroid disorders including hypothyroidism and Hashimoto’s Thyroiditis. When exploring the total number of chronic diseases that the CHMG patients are managing, the mean number was 1.01 (SD=1.14) with a range from none to eight chronic diseases.
Table 3.1 Section I General Characteristics

<table>
<thead>
<tr>
<th>General Characteristics</th>
<th>M (SD)</th>
<th>Range</th>
<th>Total Sample (n=271) n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Portal Use</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Portal User</td>
<td></td>
<td></td>
<td>235 (87)</td>
</tr>
<tr>
<td>Non-user</td>
<td></td>
<td></td>
<td>36 (13)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td>36 (13)</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td>235 (87)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-19</td>
<td></td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td></td>
<td>23 (8)</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td></td>
<td>41 (15)</td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td></td>
<td>59 (22)</td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td></td>
<td>99 (37)</td>
<td></td>
</tr>
<tr>
<td>60-69</td>
<td></td>
<td>46 (17)</td>
<td></td>
</tr>
<tr>
<td>70-79</td>
<td></td>
<td>2 (1)</td>
<td></td>
</tr>
<tr>
<td>80-89</td>
<td></td>
<td>1 (&lt;1)</td>
<td></td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td></td>
<td>260 (96)</td>
<td></td>
</tr>
<tr>
<td>Black/African American</td>
<td></td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Hispanic/Latino/.Spanish</td>
<td></td>
<td>1 (&lt;1)</td>
<td></td>
</tr>
<tr>
<td>American Indian or</td>
<td></td>
<td>2 (1)</td>
<td></td>
</tr>
<tr>
<td>Alaska Native</td>
<td></td>
<td>3 (1)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td></td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Native Hawaiian or</td>
<td></td>
<td>4 (1)</td>
<td></td>
</tr>
<tr>
<td>Pacific Islander</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; High School</td>
<td></td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>HS or GED</td>
<td></td>
<td>37 (14)</td>
<td></td>
</tr>
<tr>
<td>Associate Degree</td>
<td></td>
<td>73 (27)</td>
<td></td>
</tr>
<tr>
<td>Bachelor Degree</td>
<td></td>
<td>93 (34)</td>
<td></td>
</tr>
<tr>
<td>Master Degree or Post</td>
<td></td>
<td>68 (25)</td>
<td></td>
</tr>
<tr>
<td>Graduate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chronic Illnesses</strong></td>
<td>1.01 (1.14)</td>
<td>0-8</td>
<td></td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$24,999</td>
<td></td>
<td>7 (3)</td>
<td></td>
</tr>
<tr>
<td>$25-49,999</td>
<td></td>
<td>42 (16)</td>
<td></td>
</tr>
<tr>
<td>$50-99,999</td>
<td></td>
<td>95 (37)</td>
<td></td>
</tr>
<tr>
<td>&gt;$100,000</td>
<td></td>
<td>113 (44)</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3.1 “In the last year, have you managed a personal chronic disease such as…?” (Select all that apply).

The second section of the survey contained information regarding the current status of online health information use and health management. Question, “Where do you mainly obtain necessary health information?”, only 19% replied that they obtained information from the patient portal while 48% obtained information from the internet. As 48% obtain information from the internet, this shows that nearly half are currently using technology attesting to their HIT self-efficacy. The majority of respondents selected the doctor or nurse as the source of necessary health information (Figure 3.2).
“Where do you mainly obtain necessary health information?” (Select all that apply)

The majority of the patients indicated that they sought information using technology less than monthly and the majority stated that they never or infrequently (less than once a month) sought health information using technology via the patient portal. A related question asked how many websites they navigated while seeking health information to which the majority replied with two to three. Finally, the patient was asked if they had ever used a computer or smart phone application for health management (Table 3.2).

In the analysis of the purpose for using an online health information website, the majority stated that they used the website to gather information for disease diagnosis and treatment (Figure 3.3). They also noted comments in the free text area including “contact or question my doctor” and “to not bother my provider with answers that I can research myself. Position me to ask precise questions to not take up too much time of my provider”.

Figure 3.2
## Table 3.2 Section II Current Status of Online Health Information Use and Health Management

<table>
<thead>
<tr>
<th>Current Status of Online Health Information Use and Health Management</th>
<th>Total Sample (n=271) n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>How often do you seek information using technology?</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>9 (3)</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>95 (35)</td>
</tr>
<tr>
<td>Once a month</td>
<td>42 (15)</td>
</tr>
<tr>
<td>2-3 times a month</td>
<td>57 (21)</td>
</tr>
<tr>
<td>Once a week</td>
<td>13 (5)</td>
</tr>
<tr>
<td>2-3 times a week</td>
<td>30 (11)</td>
</tr>
<tr>
<td>Daily</td>
<td>25 (9)</td>
</tr>
<tr>
<td><strong>How often do you seek information on the patient portal?</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>111 (41)</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>137 (51)</td>
</tr>
<tr>
<td>Once a month</td>
<td>13 (5)</td>
</tr>
<tr>
<td>2-3 times a month</td>
<td>9 (3)</td>
</tr>
<tr>
<td>Once a week</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td>2-3 times a week</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Daily</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>How many websites do you usually navigate when seeking health information?</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>29 (11)</td>
</tr>
<tr>
<td>2-3</td>
<td>177 (66)</td>
</tr>
<tr>
<td>4-5</td>
<td>48 (18)</td>
</tr>
<tr>
<td>6-10</td>
<td>10 (4)</td>
</tr>
<tr>
<td>11-20</td>
<td>3 (1)</td>
</tr>
<tr>
<td><strong>Have you ever used a computer or smart phone application for health management (weight control, exercise, etc.)?</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>167 (62)</td>
</tr>
<tr>
<td>No</td>
<td>103 (38)</td>
</tr>
</tbody>
</table>
Figure 3.3 “What’s your purpose for using an online health information website?” (Select all that apply)

Question 15 asked, “For whom do you usually retrieve health information on the internet? (Select all that apply)” to which the majority (70%) noted that they usually retrieve health information for themselves followed by 32% for a spouse, 24% for a child, 23% for another family member and 8% for a friend. This information is important as the facility develops policy and procedure guiding decisions regarding patient portal proxy use and the security of personal health information (Figure 3.4).
**Figure 3.4** “For whom do you usually retrieve health information on the internet?” (Select all that apply)

Question 17 asked, “Which information technology devices do you use for online access? (Select all that apply)” to which the majority replied that a smart phone was used most frequently (Figure 3.5). An open ended item where participants are free to write any response was included and comments included “all of the above”, “iPod-podcasts” and one comment “none”.

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[Diagram showing the distribution of responses for whom health information is retrieved on the internet, with the highest percentage being for oneself, followed by children and other family members, with the lowest for spouse or S.O.]

---

30


**Figure 3.5** “Which information technology devices do you use for online access?” (Select all that apply)

Question 18 asked, “What information would be beneficial for you to access via the patient portal?” (Select all that apply) The majority of the responses identified administrative functions such as manage appointments, send and receive SMS, medication refills, referral requests and screening reminders as most beneficial (Figure 3.6). These administrative functions are currently offered to all patient portal registrants. Education and health information was cited by 44% as beneficial and is also currently available through the patient portal. Laboratory results are currently offered as well but in a very limited capacity. Of the information that is not currently offered via the patient portal, the area identified by the majority as beneficial was the ability to view labs and diagnostic study results (63%). The next most frequently cited beneficial information was the ability to view office visit summaries (46%). Question 18 also included the option to add comments as free text. Comments included “read the notes from my doctors” and
“this is not useful, was only able to obtain appointments, provider notes were not available, it was difficult to access with the password and user name, very disappointing”.

**Figure 3.6** “What information would be beneficial for you to access via Patient Connect-My CHMG Health Care?” (Select all that apply)

The third section assessed for the patients’ health belief and concerns which was identified in the HITAM model as an antecedent to the perception of seriousness and susceptibility which combine to form the mediating process of perceived threat within the Health Zone. The majority of the patients agreed with the statements addressing their interest in their health. The fourth section addressed how the patients’ think about their understanding of health. This section, addressing subjective norm and health knowledge, has been identified in the HITAM model as the degree that social pressure and influence as well as the sense of community
competition impacts the perception of usefulness. The majority of the CHMG patients’ chose the response to indicate that they neither agreed nor disagreed with the statements.

In the fifth and sixth sections, the mediating process of perceived threat is addressed by assessing the patients’ perceptions of susceptibility and seriousness. When asked if they had a higher likelihood of having a personal chronic disease, the patients were nearly split evenly into those who agree, those who disagree and those who were neutral on the topic. However, nearly 74% agreed that there was a family history of chronic disease. Lastly, the majority disagreed that they had a strong possibility of developing a chronic disease due to the influence of daily habits such as diet, exercise, and smoking or drinking. As for the perception of seriousness and the impact of a chronic disease on work and home life, relationships and suffering due to the sequela of chronic disease, the majority agreed. The majority agreed that they were afraid of developing a chronic disease or having deterioration of a chronic disease. The perceptions of susceptibility and seriousness are combined in the HITAM theory as the mediating process of the perception of threat. This process contributes to the perception of usefulness of the overall health information technology.

HIT Self-Efficacy is assessed by the answers to the questions in the seventh section. The patients’ agreed with the statements regarding their own self-efficacy for using the internet and personal computers or smart phones, yet there was no consensus as to whether they excelled compared to others. They also agreed that it was both interesting and useful to find information via the use of HIT. This factor contributes to the perceptions of ease of use as well as usefulness.

The majority of the CHMG patients stated that they neither agreed nor disagreed with statements attesting to the credibility, reliability, professionalism, and acceptable quality of HIT.
However, they did agree that the contents were easily understandable. Both HIT Self-efficacy and HIT Reliability have been identified in the HITAM model as antecedents to both perceived usefulness and perceived ease of use.

The mediating process of perceived ease of use was assessed via the questions in the ninth section. The majority of CHMG patients agreed with the statements that the use of HIT is easy and convenient as well as the statements that it takes less time and effort than other methods of health information search.

The majority of the patients in the total sample agreed with the statements that addressed the perception of usefulness with the exception of the statement “I’ve gone to a doctor of a medical institution based on health information I found on the internet via information technology”. To that statement, the majority (over 47%) disagreed. According to the HITAM, the mediating processes of perceived usefulness and ease of use contribute to the development of a positive attitude which, in turn, contributes to the behavioral intention.

In this assessment of the total sample, the CHMG patients noted a positive attitude with agreement with the three questions in section eleven as well as agreement with the statements regarding the ongoing intent to use HIT. The outcomes of attitude and behavioral intention lead to a change in behavior. In this project, the change in behavior is noted by registration and use of a patient portal. The individual scores for each question in the third through final sections were summed to provide a total summative score. The mean scores are reflective of overall agreement by the total sample with the statements in each section representing the concepts addressed in the survey (Table 3.3).
Table 3.3 Concept and Patient Engagement Summative Scores

<table>
<thead>
<tr>
<th>Concept</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>III: Health Belief and Concerns</td>
<td>21.16</td>
<td>2.99</td>
<td>7-25</td>
</tr>
<tr>
<td>IV: Subjective Norm</td>
<td>17.54</td>
<td>2.76</td>
<td>9-24</td>
</tr>
<tr>
<td>V: Perceived Threat: Susceptibility</td>
<td>9.38</td>
<td>2.53</td>
<td>3-15</td>
</tr>
<tr>
<td>VI: Perceived Threat: Seriousness</td>
<td>13.5</td>
<td>3.04</td>
<td>4-20</td>
</tr>
<tr>
<td>VII: HIT Self-Efficacy</td>
<td>23.67</td>
<td>3.41</td>
<td>13-30</td>
</tr>
<tr>
<td>VIII: HIT Reliability</td>
<td>16.38</td>
<td>2.80</td>
<td>8-25</td>
</tr>
<tr>
<td>IX: Perceived Ease of Use</td>
<td>20.03</td>
<td>2.98</td>
<td>8-25</td>
</tr>
<tr>
<td>X: Perceived Usefulness</td>
<td>17.75</td>
<td>2.87</td>
<td>6-25</td>
</tr>
<tr>
<td>XI: Attitude</td>
<td>11.53</td>
<td>1.78</td>
<td>4-15</td>
</tr>
<tr>
<td>XII: Intent to Use</td>
<td>11.46</td>
<td>1.92</td>
<td>3-15</td>
</tr>
<tr>
<td>XIII: PAM®</td>
<td>3.23</td>
<td>0.70</td>
<td>1-4</td>
</tr>
</tbody>
</table>

Finally, the last items on the survey were the ten questions of the Patient Activation Measure (PAM®). Frequencies for PAM® Level Scores (Figure 3.7) are noted with Level 1 reflective of a patient who is “disengaged and overwhelmed”, Level 2 reflective of a patient who is “becoming aware but still struggling”, Level 3 reflective of a patient who is “taking action” in their own health care and level 4 reflective of a patient who is “maintaining behaviors and pushing further” (Hibbard, Stockard, Mahoney, & Tusler, 2004, p.1015). The PAM® Level frequencies were analyzed with descriptive statistics. Overall there was a large percentage of patients who scored a Level 3 (54%) or Level 4 (35%) on the PAM® instrument reflective of higher patient activation or engagement. When evaluating the PAM® Levels for the matched cohort data the results were very similar for patient activation (Figure 3.8).
Results: Phase I Matched Cohort t-test

The second step in the data analysis was to compare differences in portal users versus non-users with respect to the HITAM model variables. Differences were identified in the perception of usefulness as well as the related outcomes of attitude and intent to use the technology (Table 3.4).
Table 3.4 \(t\)-test results for portal use (registered for the patient portal yes/no)
p<0.05*, p<0.001**

<table>
<thead>
<tr>
<th>Concept</th>
<th>T ratio</th>
<th>Df</th>
<th>Prob &gt; [t]</th>
<th>Prob &gt; t</th>
<th>Prob &lt; t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness</td>
<td>-2.84</td>
<td>67.00</td>
<td>0.0059**</td>
<td>0.9971</td>
<td>0.0029**</td>
</tr>
<tr>
<td>Attitude</td>
<td>-2.08</td>
<td>65.97</td>
<td>0.0418*</td>
<td>0.9791</td>
<td>0.0209*</td>
</tr>
<tr>
<td>Intent to Use</td>
<td>-3.479</td>
<td>59.467</td>
<td>0.0009**</td>
<td>0.9995</td>
<td>0.0005**</td>
</tr>
</tbody>
</table>

Results: Phase I Predictors of Portal Use

Perceived usefulness was a variable found to predict the intent to use a patient portal. If a patient perceives that the patient portal is useful, they are 1.44 times more likely to register and use a patient portal (Table 3.5).

Table 3.5 Predictors of Portal Use

<table>
<thead>
<tr>
<th>Term</th>
<th>Odds Ratio</th>
<th>Lower 95%</th>
<th>Upper 95%</th>
<th>Reciprocal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Seriousness</td>
<td>1.055898</td>
<td>0.891067</td>
<td>1.24799</td>
<td>0.9470611</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>0.891019</td>
<td>0.745128</td>
<td>1.064206</td>
<td>1.1223106</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>1.442006</td>
<td>1.203332</td>
<td>1.751835</td>
<td>0.6934784</td>
</tr>
</tbody>
</table>

Summary

Based on the results of the Patient Connect-My CHMG survey analysis, it is clear that several factors are contributing to the decision to register and use the patient portal. While 48% of the CHMG population selected the internet, only 19% selected the patient portal as a source of information. In addition, 48% selected view office visit summary as beneficial information with free text comments requesting the release of the provider’s notes. There was no consensus from the CHMG population that the information was credible, reliable, professional, or of acceptable quality suggesting that the output quality of the health information was not optimal. These
factors are contributing to the perception of usefulness. Lastly, the mediating process of perceived usefulness was found to be a significant factor in whether or not a patient uses a patient portal (OR 1.44).
IV: DISCUSSION

Summary

Important insights were gained from the two phase healthcare improvement that aimed to identify factors that increased portal use in a community medical group and a trial of open notes. Overall findings from this specific population are consistent those identified in the literature. An important insight is that the perception of usefulness is a key factor impacting attitude, intent to use and ultimately portal registration and use. More data is necessary to identify why a non-user is not registering for the patient portal.

The HITAM model was a useful framework to explain the influential factors impacting the intention and decision to use a patient portal. In this population, the impacts of HIT Reliability and Self-Efficacy had the greatest effect on the perception of usefulness. These two concepts are derived from the Technology Acceptance Model and adapted for the patient rather than the healthcare worker as the user. The concepts of the Theory of Planned Behavior including attitude and intention were also key to understanding this populations’ decision to register and use a patient portal. However, the concepts from the Health Belief Model including the perception of threat was not a contributing factor for this population. Perhaps the patient portal would be determined to be more useful by those patients managing complex chronic disease rather than the general population. Finally, the measurement of the actual change in behavior with the use of the percentage of patient who register to use the portal is a distinction between this project and the initial HITAM development by Kim and Park. Certainly a link between behavior intent and actual change in behavior is recognized, yet they are not the same
outcome. The second phase of this project identified a strategy likely to improve the situation of suboptimal portal registrations. The results of the Open Note pilot should provide insight into the link between intent and a change in behavior.

An overall perspective of the CHMG population is that the majority were white, middle aged, middle class women with at least a bachelor’s degree, who manage at least one chronic illness. Women are typically portal users in contrast to men as they potentially carry the major responsibility of health care for the family. The CHMG population had a high degree of HIT self-efficacy but there was no consensus regarding HIT reliability. The research regarding HIT reliability and self-efficacy supports that both are noted factors in patient satisfaction with the patient portal. Patient satisfaction has been noted in the literature to have an effect on perceived usefulness and patient engagement. It was not possible to look at any ethnic differences in the CHMG population because there was little diversity in the sample. It can also be assumed that individuals who make over 50K, as identified in this sample, are people who can afford a computer which was necessary for access to the CHMG patient portal.

In the future, attempts should be made to fully assess the perceptions of those CHMG patients not represented here. For example, the CHMG practice with the lowest percentage of portal registrations is a practice with Nepalese and Somalian immigrants. Communication with this population has necessitated changes within the practice for interpreters and written documents translated into their native language. However, the current patient portal is only offered in the English language.

Study findings show that the perception of usefulness is a key process which impacts attitude, intent to use and ultimately portal registration and use. The overall findings from this
specific population are consistent with a review of the literature regarding the related concepts of patient satisfaction and the effect on perceived usefulness. Zickmund et al (2008) found that patients who reported a decreased satisfaction with the experience of using a patient portal were disinterested in the use. Since portal users were more likely to perceive that the patient portal was useful, this could have contributed to their positive attitude and eventual intent to use. The relationship between a positive attitude and behavioral intention has been noted by several researchers including Goel et al (2011) and Goldzweig et al (2013).

Lastly, more data is necessary to identify why a non-user fails to register for the patient portal. The survey distribution methods used in this project were successful in gathering data regarding the portal users’ perceptions but limited in determining the non-users perceptions. Currently, CHMG only records the e-mail address for those who are registered with the patient portal which could have substantially impacted the survey results. Even the use of the “pop-up” survey on the facility web page failed to capture the non-user. To overcome this potential selection bias and assess the non-users’ perceptions may require a different methodology. Traditional paper surveys could be mailed to the home residence or CHMG representatives could collect data from patients during office visits. A simple suggestion to capture the perspective of all users in the future would be to enter the email addresses for every patient along with traditional information such as home street address and phone number. Renewed efforts by the CHMG Patient Connect Operations Committee to address marketing and clinical staff education may also be of benefit.

As a DNP student implementing a healthcare improvement project, several insights were gained in this experience. The importance of the key concepts of organizational leadership are
crucial in any complex adaptive system. The DNP leader has to embrace the highly engaging, experiential learning process. This requires thoughtful self-reflection and a willingness to embrace new modes of thinking. The importance of the process of negotiation within an organization by influencing people toward common goals cannot be understated. The DNP leader needs to accept that conflict is a normal occurrence and to ready oneself for action rather than to shy away from the uncomfortable emotions. This self-awareness will allow the DNP to appreciate their strengths while recognizing opportunities for personal growth.

Another crucial insight was of the importance of inter-professional collaboration. This project could not have been accomplished without the efforts of those who excel in information technology. The contributions of those who guard the privacy and security of the patients ensure that their personal health information is protected. The patients’ voice through the completion of the survey and the participation on the patient portal committee are crucial to understanding what is necessary in the process of portal use. The entire team joins with shared goals and vision for enhanced health of the population.

Lastly, the determination of strategies likely to cause an improvement should be evidence-based. The scientific underpinnings of the work of the DNP include an appreciation of data analysis to determine what are significant rather than anecdotal findings. This process requires thoughtful consideration and a willingness to assess the problem from many perspectives. In this regard, the healthcare improvement process can truly lead to best practice.

Interpretation

An opportunity to improve the information on the patient portal to address the CHMG patients’ needs was noted. Improving the output quality has the potential to positively impact
their perception of usefulness of the patient portal which in turn will impact overall portal use. The decision to implement a trial of Open Notes was identified as a strategy likely to address the specific aim of increasing the percentage of patients who register to use the patient portal to the benchmark of >50%. Preliminary results are consistent with the literature which include the patients’ perceptions of the benefits and risks associated with the release of the office visit note through the patient portal. While there were concerns about data privacy and security, the transparency in the communication between the patient and the provider was appreciable.

Other methods of improving the perception of usefulness may include attention to the other zones of influence as highlighted by the HITAM. The EMR platform and functionality was an area noted by the patients with comments such as “it’s a pain to get into and access”, and “difficult to access with the password and username, disappointing”. By addressing the perceived enjoyment within the HIT Self-Efficacy realm, the perceived ease of use and usefulness could be improved.

Limitations

Use of the HITAM model was an effective way to assess the perceptions of the patient regarding the health, information and technology zones. However, the survey burden due to the number of questions may impair assessment. Exploration into refinement of the survey to limit this burden may be beneficial for future use. The HITAM model highlights the importance of HIT reliability and HIT self-efficacy in overall perception of usefulness and ease of use. The portal should be continually assessed by the CHMG patients regarding the quality of the experience. In addition, an opportunity exists to support the patients HIT self-efficacy by offering educational programs in the use of HIT.
A second limitation noted in this project was in the method for survey distribution. The majority of the survey respondents were current portal users. While there were only a limited number of significant differences in the perceptions of the non-users as compared to the portal users in the matched cohort analysis, alternative methods should be considered to fully assess the perceptions of the current non-users. This suggestion for further study may highlight alternative interventions to increase patient portal use.

The implementation process in the release of the office visit note was impacted by limited resources and competing demands. As the facility transitions to an enterprise-wide EMR, the personnel recruited to collaborate with this initiative were also addressing the needs of a current state review. The implementation process was delayed due to limited IT support as they were crucial to the current state review. While a pre-test/post-test assessment of the CHMG patients was planned initially, the clinical team expressed concerns about the added workflow. This led to the decision to assess the patients’ perceptions of the benefits and risks to the release of the office visit note only after the note had been released. This decision may have contributed to the low response rate to the Open Notes post-implementation patient survey.
V. CONCLUSIONS

The global aim of this two part research translation and healthcare improvement project was to optimize patient engagement with the use of the patient portal and contribute to increasing CHMG’s ability to attest to Meaningful Use. The specific aim of this health care improvement project was to implement an evidence-based intervention into clinical practice to increase the percentage of CHMG patients who register to use the patient portal from baseline to the benchmark of >50%. By using the HITAM model as a conceptual framework, perceived usefulness was identified as a key factor impacting portal use. A trial of open notes was based on this finding. The trial is currently ongoing and will be evaluated in the near future.

There is an opportunity to improve the quality of the information in the patient portal and to utilize a platform amenable to the adoption of smart phone applications. While most patients mainly receive their necessary health information from the doctor or nurse, the use of the internet highlights an opportunity for the patient to utilize HIT to receive information from the health care team via the patient portal. The use of Open Notes provides an opportunity to improve the perception of usefulness and ultimately the decision to use a patient portal.

Finally, as assessed by the PAM® instrument, the baseline data obtained shows that the CHMG patient population is currently engaged in their care. This overall patient engagement suggests that the mission of the organization to influence full patient engagement in their own health care is currently being addressed. While there were no significant differences when comparing portal users to non-users regarding patient engagement, the opportunity exists to fully assess the current non-users to validate this belief. This calls into question the premise that use
of health information technology via the use of a patient portal will optimize patient engagement. Exploration into the patient activation or engagement for non-users would be beneficial to determine if there were differences.

**Implications for Practice**

The first recommendation is to optimize the output quality of the patient portal as a source of information. During the process of this DNP project, it was noted that the patients’ perspective was necessary. The survey of the CHMG patients was a start in this process but representative of the current portal user. Future efforts should be made to obtain the non-users perspective. The Patient Connect Operations Committee members noted that patient member representation would enhance the process and became the first committee at CHMG to solicit patient volunteers as members. Efforts should be made to sustain this initiative and expand the opportunities for other CHMG committee participation. The enhanced functionality of the new EMR will enable optimization of the quality of the information as well as provide for use of a smartphone application.

The second recommendation includes proactively developing policy and procedure regarding the release of personal health information via the patient portal. While the most frequently requested data perceived to be of benefit was the release of laboratory and diagnostic test results, the organization was not prepared to proceed without fully exploring the implications of the release through the patient portal.

A third recommendation includes scrutiny of the family management policy to guide proxy use permitting family members to access their loved ones personal health information. The data obtained in this project suggests that this is a desired function with policy and
procedure implications regarding what information can be released to whom. Currently, the most challenging aspect of the family management concerns the availability of the personal health information of the adolescent aged 12-18 years as stipulated by federal and state legal guidelines. Exploration of a balance of proxy use for administrative functions while protecting sensitive information is necessary.

Finally, an opportunity exists to optimize education for the CHMG patients, clinical team and providers to encourage portal registration and use. Attention to potential disparity based on age, gender, income and education to limit the effects of the digital or social divide is necessary. The portal should be made available to all CHMG patients and the use encourage irrespective of preconceived notions regarding portal use.

**Sustainability**

The CHMG patient perceptions are valued by the organization and critical to achieving their mission for full patient engagement. The sustainability of the implementation of *Open Notes* may be dependent on the provider and office staff perceptions as to the impact on their workflow and relationships with the patients. To further identify these factors, the clinician perceptions of benefits and risks should be explored. Full administrative support should be offered for providers willing to sustain the implementation of the release of the office visit note.

**Final Thoughts**

The use of health information technology via the patient portal has the potential to improve the patient experience and outcomes to enhance the quality of care. The entire health care team, led by the DNP, should partner with the patient to deliver a portal that is perceived to be useful in self-management. A patient portal that is perceived to be easy to use and useful will
impact a positive attitude that will lead the patient to making the decision to register and use this valuable tool. It is this meaningful use of technology that true benefits can be attained.
FUNDING

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REFERENCES


APPENDIX A

Patient Connect-My CHMG Survey

I. General Characteristics
In the following questions, please choose what corresponds with you.

1. Informed Consent

2. I have registered for Patient Connect-My CHMG Health Care
   ① Yes ② No

3. Gender ① Male ② Female

4. Age
   ① 18~19
   ② 20~29
   ③ 30~39
   ④ 40~49
   ⑤ 50~59
   ⑥ 60~69
   ⑦ 70~79
   ⑧ 80 and above

5. Race
   ① White/Caucasian
   ② Black/African American
   ③ Hispanic/Latino/ Spanish
   ④ American Indian or Alaska Native
   ⑤ Asian
   ⑥ Native Hawaiian or other Pacific Islander
   ⑦ Other ______________________

7. Educational Background
   ① less than high school
   ② High school graduate or equivalent (GED)
   ③ Associate Degree
   ④ Bachelor Degree
   ⑤ Master’s Degree and post graduate education (PhD, MD, etc.)
8. In the last year, have you managed personal chronic disease?
   (0) chronic diseases
   ① chronic disease
   ② chronic diseases
   ③ chronic diseases
   ④ chronic diseases
   ⑤ chronic diseases

9. How much is your yearly household income (total household income) on average?
   ① < $24,999  ② $25,000-49,999  ③ $50,000-99,999  ④ $ 100,000

II. Current Status of Online Health Information Use and Health Management
   The following questions concern the current status of online health information use and health management.

10. Where do you mainly obtain necessary health information (select all that apply)?
    ① Health program offered by a medical institution or a public health center
    ② Books, newspapers, magazines, pamphlets etc.
    ③ Doctor, nurse, pharmacist, etc.
    ④ TV, radio, etc.
    ⑤ Parent, family, friend, etc.
    ⑥ Internet
    ⑦ Patient Connect-My CHMG Health Care

11. How often do you seek health information using technology?
    ① Never
    ② Less than once a month
    ③ Once a month
    ④ 2-3 times a month
    ⑤ Once a week
    ⑥ 2-3 times a week
    ⑦ Daily

12. How often do you seek health information on Patient Connect-My CHMG Health Care?
    ① Never
    ② Less than once a month
    ③ Once a month
    ④ 2-3 times a month
    ⑤ once a week
    ⑥ 2-3 times a week
    ⑦ Daily
13. How many websites do you usually navigate when seeking health information?

1. 1
2. 2-3
3. 4-5
4. 6-10
5. 11-20

14. What's your purpose for using an online health information website? (Select all that apply)

1. Information gathering for disease diagnosis and treatment
2. Information gathering for health management (exercise, abstinence from drinking, smoking, diet, nutrition, stress, mental health, etc.)
3. Researching or learning activity
4. Purchasing products like health food, medical equipment, etc.
5. Other. Please specify. (   )

15. For whom do you usually retrieve health information on the Internet? (Select all that apply)

1. Myself
2. Spouse or significant other
3. Friend
4. Child
5. Other family member

16. Have you ever used a computer or smart phone application for health management (weight control, exercise, etc.)?

1. Yes
2. No

17. Which information technology devices do you use for online access? (Select all that apply.)

1. desktop computer
2. laptop computer
3. Smart phone (iPhone, Google Galaxy phone, etc.)
4. Tablet computer (iPad, Galaxy Tab, etc.)
5. Other. Please specify. (   )
18. What information would be beneficial for you to access via *Patient Connect-My CHMG Health Care* (select all that apply)?

- Manage appointments (make, cancel or reschedule appointments)
- Send and receive a secure message (e-mail) to your provider’s office
- Request medication prescription refills
- Request referrals
- View current medication list
- View laboratory and diagnostic study results
- Transmit data frequently monitored (Blood Pressure, Weight, Blood Glucose Readings, etc.)
- View current problem list
- View office visit summaries
- Reminders for preventative care (screenings, immunizations, etc.)
- Education and health information links
- Technology Support/Help Desk for *Patient Connect-My CHMG Health Care* use.
- Other (specify______________________)

III. **Health Belief and & Concerns**

The questions below address your degree of interest in health.

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. I am very interested in my health.</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
</tr>
<tr>
<td>20. I attentively read or watch news of health such as article or program (newspaper, magazine, TV, etc.).</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
</tr>
<tr>
<td>21. I believe that managing my health can be productive.</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
<td>![Rating Scale]</td>
</tr>
</tbody>
</table>
22. I am sufficiently willing to manage my health.

23. I am currently active in my managing my health.

IV. Subjective Norm and Health Knowledge

The questions below cover how you think about your understanding of health.

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. My friends or acquaintances influence my behavior in managing my health.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25. When my friend or acquaintance manages their health, I feel a sense of rivalry to do better.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26. I think I am aware of health or disease to a certain extent.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27. I think I am aware of health or disease to a certain extent compared with my friend or acquaintance.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28. I think I am aware of health or disease to a certain extent compared with experts.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
V. Perceived Susceptibility

After reading the following description, please select the number that corresponds to your thinking.

(Chronic disease refers to hypertension, diabetes, obesity, hyperlipidemia, cardiovascular disease, chronic obstructive pulmonary disease, musculoskeletal disorder, etc.)

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>29. I have a higher likelihood of having a chronic disease.</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
<td>⑤</td>
</tr>
<tr>
<td>30. There is a person with a chronic disease among my family members.</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
<td>⑤</td>
</tr>
<tr>
<td>31. I have a strong possibility of developing a chronic disease or deterioration of a chronic disease due to daily habits (drinking, smoking, dietary habit, lack of exercise, etc.).</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
<td>⑤</td>
</tr>
</tbody>
</table>

VI. Perceived Seriousness

After reading the following description, please select the number that corresponds to your thinking. (Chronic disease refers to hypertension, diabetes, obesity, hyperlipidemia, cardiovascular disease, chronic obstructive pulmonary disease, musculoskeletal disorder, etc.)

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>32. I am afraid of developing a chronic disease or deterioration of a chronic disease.</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
<td>⑤</td>
</tr>
</tbody>
</table>
33. If I develop a chronic disease or deterioration of a chronic disease, I will have difficulty with my work or home life.

34. If I develop a chronic disease or deterioration of a chronic disease, it will hinder my personal relationships.

35. If I develop a chronic disease or deterioration of a chronic disease, I will suffer from the problems that result.

VII. HIT Self-Efficacy

The questions below deal with your own capacity that you perceive during the use of online health information and health management via information technology (desktop, laptop, smart phone, etc.).

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>36. I am good at using the Internet via desktop computer, laptop computer, tablet, smart phone, etc.</td>
<td>①  ②  ③  ④  ⑤</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. I think I excel compared to others in online access technique or capacity via desktop computer, laptop computer, tablet, smart phone, etc.</td>
<td>①  ②  ③  ④  ⑤</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
VIII. HIT Reliability

The questions below deal with the reliability of health information technology that you perceive during the use of online health information and health management via information technology (desktop, laptop, smart phone, etc.).

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>42. It is credible to use the information found via technology to provide for health management.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
43. The internet website contents for provision of health information and health management are reliable.

44. The internet website contents for provision of health information and health management are professional.

45. The internet website contents for provision of health information and health management are of acceptable quality.

46. The internet website contents for provision of health information and health management are easily understandable.

IX. Perceived Ease of Use

The questions below deal with the ease of use that you perceive during the use of online health information and health management via information technology (desktop, laptop, smart phone, etc.).

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>47. Whenever I want to find health information, I can access the internet via technology.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48. It takes less time to use computer technology to find information (information technology) than other media for health information search and health management.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
49. It takes less effort to use computer technology to find information (information technology) than other media for health information search and health management.

50. It is easy to find health information and learn health management tips on the internet using information technology.

51. It is convenient to find health information and learn health management tips on the internet using information technology.

X. **Perceived Usefulness**

The questions below cover the usefulness that you perceive during the use of Patient Connect online health information and health management via information technology (desktop, laptop, smart phone, etc.).

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>52. The internet is an economic way to find online health information and perform health management using information technology.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>53. Online health information retrieval via the information technology has improved my understanding of symptom, ailment, therapy, and health management of my usual interest</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
54. Online health information retrieval via information technology has improved my ability for health management.  

55. I've gone to a doctor or a medical institution based on health information I found on the internet via information technology.  

56. Health information I found on the internet has influenced my lifestyle for good health (exercise guidelines, dietary habit, etc.).  

XI. Attitude

The questions below relate to your attitude that you take during the use of online health information and health management via information technology (desktop, laptop, smartphone, etc.).

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>57. I consider the use of the internet for health information search and health management to be a positive action.</td>
<td>1 ———— 2 ———— 3 ———— 4 ———— 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58. Online health information search and health management are helpful for me.</td>
<td>1 ———— 2 ———— 3 ———— 4 ———— 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>59. Overall, I am satisfied with the use of the internet for health information search and health management.</td>
<td>1 ———— 2 ———— 3 ———— 4 ———— 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
XII. Intent to Use

The below questions relate to your *ongoing intent to use* information technology (desktop, laptop, smart phone, etc.) for online health information search and health management.

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>60. I will continue to perform online health information search and health management via information technology.</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
<td>⑤</td>
</tr>
<tr>
<td>61. I will regularly access the internet via information technology for health information search and health management.</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
<td>⑤</td>
</tr>
<tr>
<td>62. I will recommend the use of the internet via information technology to others as a method for health information search and health management.</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
<td>⑤</td>
</tr>
</tbody>
</table>

Questionnaire adapted 2015 with author permission based on the original questionnaire developed & used for the Health Information Technology Acceptance Model (HITAM)

All Rights reserved 2013 Jeongeun Kim & Hyeoun-Ae Park (2012)
APPENDIX B

Below are some statements that people sometimes make when they talk about their health. Please indicate how much you agree or disagree with each statement as it applies to you personally by circling your answer. Your answers should be what is true for you and not just what you think the doctor wants you to say.

If the statement does not apply to you, circle N/A.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Disagree Strongly</th>
<th>Disagree</th>
<th>Agree Strongly</th>
<th>N/A Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When all is said and done, I am the person who is responsible for taking care of my health</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Taking an active role in my own health care is the most important thing that affects my health</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I know what each of my prescribed medications do</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I am confident that I can tell a doctor concerns I have even when he or she does not ask.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I am confident that I can follow through on medical treatments I may need to do at home</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I know how to prevent problems with my health</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I am confident I can figure out solutions when new problems arise with my health.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I am confident that I can maintain lifestyle changes, like eating right and exercising, even during times of stress.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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E-Mail: pamela.kallmerten@unh.edu

Comments: PAM research license for up to 250 participants
PAM®: For Academic Research Only
SEPTEMBER 22, 2015:

Dear Concord Hospital Medical Group (CHMG) patient,

I am a doctoral student at the University of New Hampshire and I am conducting a research project to find out the reasons why a patient would or would not decide to use the secure online website, Patient Connect-My CHMG Health Care. I am writing to invite you to take part in this survey. My goal is to have approximately 250 patients complete the survey. You must be at least 18 years old to participate in this study and a current patient of one of the Concord Hospital Medical Groups.

If you agree to participate in this survey, you will be asked to open an e-mail from one of the primary care providers and click on a secure web link that will connect you with an anonymous survey. The survey will ask you information such as whether or not you use the website, Patient Connect-My CHMG Health Care, basic demographic information as well as your views on your health status, use of technology and your ability to care for yourself. There are no direct or immediate benefits for completing the survey. However, the information that we receive will be used to improve Patient Connect-My CHMG Health Care.

Participation in this survey is completely voluntary. Your responses will be anonymous. If you agree to complete the survey, you may refuse to answer any question and/or if you change your mind, you may withdraw from completing the survey at any time.

The information that you provide will be treated confidentially and all written and recorded information will be stored securely. Recorded and transcribed information will be stored on a personal laptop that is password protected. I will report the summary data to CHMG to identify ways to improve Patient Connect-My CHMG Health Care.

If you have any questions about this project or the survey, you may contact Pamela Kallmerten RN at pamela.kallmerten@unh.edu or 603-862-1123 or a representative of Concord Hospital at 603-230-6152.

By clicking on the web link below you verify that:

You are at least 18 years of age
You understand the purpose of this survey

https://unh.az1.qualtrics.com/SE/?SID=SV_5yynwy4e9HoRhCR

Thank you for your consideration.

Sincerely,

Pamela S. Kallmerten, RN University of New Hampshire Doctorate of Nursing Practice Candidate
29-Sep-2015

Kallmerten, Pamela S
Nursing, Hewitt Hall
Durham, NH 03824-3520

IRB #: 6318
Study: The Exploration of Influential Factors Affecting the Intention and Decision to Use A Patient Portal
Approval Date: 24-Sep-2015

The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved the protocol for your study as Exempt as described in Title 45, Code of Federal Regulations (CFR), Part 46, Subsection 101(b). Approval is granted to conduct your study as described in your protocol.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the attached document, Responsibilities of Directors of Research Studies Involving Human Subjects. (This document is also available at http://unh.edu/research/irb-application-resources.) Please read this document carefully before commencing your work involving human subjects.

Upon completion of your study, please complete the enclosed Exempt Study Final Report form and return it to this office along with a report of your findings.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or Julie.Simpson@unh.edu. Please refer to the IRB # above in all correspondence related to this study. The IRB wishes you success with your research.

For the IRB,

Julie F. Simpson
Director

cc: File
   Samuels, Joanne
Pamela S. Kallmerten, RN  
Paul Clark, MD  
Concord Hospital  
250 Pleasant St  
Concord, NH 03301

Dear Dr. Clark and Ms. Kallmerten,

After review of the protocol "The Exploration of Influential Factors Affecting the Intervention and Decision to Use a Patient Portal", I have determined it to be exempt from Human Investigation Committee (IRB) review based on the regulatory guidance cited below.

CFR Title 45 Part 46.101
(b) Unless otherwise required by department or agency heads, research activities in which the only involvement of human subjects will be in one or more of the following categories are exempt from this policy:

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior; and unless: (i) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

(3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b) (2) of this section, if: (i) The human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) require(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Based on my review of the information provided in that the survey link will be sent to patients via a CHMG employee (Dr. Clark) and the data will be de-identified for the analysis being performed by Ms. Kallmerten, the protocol meets the exemption criteria. However, please note that if at any point in time the methodology of the study or collection of this data changes, the protocol may no longer qualify for an exemption and a re-review should occur.

Thank you for bringing the protocol before the Human Investigation Committee for appropriate review prior to its inception.

If you have any additional questions or concerns, you may contact Lisa Rochford, Research and Education Coordinator at 603-227-7000 x3340.

Sincerely,

Andrew Westbrook, M.D.

Andrew Westbrook, MD, Chair  
Human Investigation Committee
APPENDIX F

My Inbox

HOW DO I REPLY TO MY PROVIDER OFFICE?

The Inbox is for receiving messages only. Please click here to send a message to your provider office.

HOW LONG DO I HAVE ACCESS TO MY MESSAGES?

Your messages will be automatically deleted after 90 days. If you would like to save specific messages, please save the information to your computer or print it for your file.

PRINTING ISSUES?

If you are having difficulty printing from Patient Connect, please copy and paste content into a Word document on your computer and print that document to retain correct formatting.

Inbox Sent Drafts Deleted Folders

<table>
<thead>
<tr>
<th>From</th>
<th>Christine Fallenham</th>
</tr>
</thead>
<tbody>
<tr>
<td>To</td>
<td>2 Test <a href="mailto:2test@yahoo.com">2test@yahoo.com</a></td>
</tr>
<tr>
<td>Subject</td>
<td>Open Note from your Healthcare Provider @ Concord Hospital</td>
</tr>
<tr>
<td>Send Date</td>
<td>Tue 4/12/2016 10:49 AM</td>
</tr>
</tbody>
</table>

Summary: 01/01/16: Open Note from your Healthcare Provider @ Concord Hospital

Patient Name: Alice L. Test
|
SBN: 000-00-0000 | DOB: 12/2/1962 |
Test: |
Clinical Dates: 4/12/2016 12:14 PM |
External ID: 019973 |

Summary: Open Note from your Healthcare Provider @ Concord Hospital

PLEASE CLICK LINK BELOW TO REVIEW FREQUENTLY ASKED QUESTIONS ABOUT OPEN NOTES
https://clinicalmessage.concordhospital.org/portal/opennotespatientFAQ/default.aspx

PLEASE GIVE US YOUR FEEDBACK - CLICK LINK BELOW TO COMPLETE SURVEY
https://app.as1.qualtrics.com/V2/ SurveyResponse?sid=SV_9nLr77Csg9MnE2T

Problem 1: HEADACHE TENSION (ICD-10-CM: 344.209)
Assessment and Plan: Prescribed medications etc.

Instructions:
Take prescribed medications etc.


Primary Care Physician
Anne Chehade MD

History of Present Illness

History from: patient

Chief Complaint: Migraine Headaches
Patient has been experiencing migraine headaches for the past week...etc.

Current Health Care Providers and Suppliers

Primary Care
PCP Office: Alton Family Medicine
Primary Care Physician: Anne Chehade MD
Primary Advanced Practitioner: Uma Polan APRN

70
February 27, 2016:

Dear Concord Hospital Medical Group (CHMG) patient,

I am a doctoral student at the University of New Hampshire and I am conducting a research project to find out the reasons why a patient would or would not decide to use the secure online website called a patient portal, Patient Connect-My CHMG Health Care to view their office visit summary. I am writing to invite you to take part in this survey. You must be at least 18-years-old to participate in this study and a current patient of a Concord Hospital Medical Group practice.

The survey will take about 10-15 minutes and will ask you for information such as what you would imagine it would be like to read your provider’s notes about your office visit and thinking about the future as a CHMG patient. There are no direct or immediate benefits for completing the survey. However, the information submitted will be used to improve Patient Connect-My CHMG Health Care.

Participation in this survey is completely voluntary. Your responses will be anonymous. If you agree to complete the survey, you may refuse to answer any question and/or if you change your mind, you may also withdraw from completing the survey at any time.

The information that is provided will not be identifiable but will be treated confidentially and all written and recorded information will be stored securely. Recorded and transcribed information will be stored on a personal laptop that is password protected. I will report the summary data to CHMG to identify ways to improve Patient Connect-My CHMG Health Care.

If you have any questions about this project or the survey, you may contact Pamela Kallmerten RN at pamela.kallmerten@unh.edu or 603-862-1123 or a representative of Concord Hospital at 603-230-6152.

By continuing with the survey you verify that:

You are at least 18 years of age.
You are a Concord Hospital Medical Group patient.
You understand the purpose of this survey.
You freely and voluntarily choose to participate in this survey.

Thank you for your consideration.
Sincerely,

Pamela S. Kallmerten, RN
University of New Hampshire Doctorate of Nursing Practice candidate

Yes (participant progresses to the first question) or No (participant is directed to the end of the survey and ‘Thank you’ page)

Open Notes

CHMG Patient Post-Implementation Survey

February 2016

Part I: How reading visit notes might affect you

In this section, please tell us what it was like to read your provider’s notes about your office visits.

<table>
<thead>
<tr>
<th>After reading my provider’s visit notes I:</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Understand my health and medical conditions better.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Worry more.</td>
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<tr>
<td>3. Remember the plan for my care better.</td>
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<td></td>
</tr>
<tr>
<td>4. Take better care of myself.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Do better with taking medications as prescribed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Feel more in control of my health care.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Am better prepared for visits.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Trust my provider more.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9. Find the notes to be more confusing than helpful.

10. Am concerned about my privacy.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Part II: Thinking about the future

In this section, please think about the future

11. If I am given a choice of providers in the future, the use of Open Notes would be an important part of my decision.

12. Do you have any other comments or suggestions about open notes? ________________

13-22. PAM® Instrument

Adapted with permission from the survey used by the Beth Israel Deaconess Medical Center Open Notes Team