**ACCEPTANCE AND USE OF PERSONAL HEALTH RECORD:
FACTORS AFFECTING PHYSICIANS' PERSPECTIVE**

Ekta Agrawal

Submitted to the faculty of the School of Informatics

in partial fulfillment of the requirements

for the degree of

Master of Science in Health Informatics,

Indiana University

December- 2010

Accepted by the Faculty of Indiana University,
in partial fulfillment of the requirements for the degree of Master of Science
in (Health Informatics)

**Master's Thesis
Committee**

_____

Dr. Josette Jones, Ph.D., Committee Chair

_____

Dr. Michael Weiner, M.D., M.P.H.

_____

Jennifer Simmermaker, M.A., R.N.

Dedicated to

My respected parents Mr. Bhagwatiprasad Kedia and Mrs. Vimala Kedia

My beloved husband Sanjay Agrawal

&

My wonderful and loving children Nikhil and Himani

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGEMENT

I would like to extend my gratitude to my thesis advisor Dr. Josette Jones for her constant support, guidance and encouragement towards the completion of my thesis and entire graduate study.

I would also like to thank Dr. Michael Weiner and Jennifer Simmermaker for their valuable time for being on my thesis committee and providing valuable suggestions.

I wish to acknowledge the help and support I have received from my fellow students Jaci Drexler, Tamara McQueen and Sudha Iyer.

I would also like to thank my colleague Kaye Gilmore for reading my thesis and providing the valuable suggestions.

Finally, my special thanks to my husband Sanjay Agrawal and my children Nikhil and Himani for their great support and encouragement throughout this process.

ABSTRACT

Ekta Agrawal

ACCEPTANCE AND USE OF PERSONAL HEALTH RECORD:
FACTORS AFFECTING PHYSICIANS' PERSPECTIVE

Acceptance of PHR by physicians is fundamental as they play important role towards the promotion of PHR adoption by providing the access to the data to be maintained in PHR and also, using the information within the PHR for decision making. Therefore it is important to measure physicians' perspective on usefulness of PHR, and also the value and trust they have in PHR usage. Review of previous researches identifies the lack of availability of a valid survey instrument that can be used to measure physicians' perception on all different aspects of PHR use and acceptance.

Using the integrated literature review methodology and Unified Theory of Acceptance and Use of Technology (UTAUT) as a guiding framework, this study was aimed to identify the factors that can be used in the development of comprehensive evaluation instrument to understand physicians' acceptance of PHR. Total 15 articles were selected for literature review and using the content analysis method, 189 undifferentiated data units were extracted from those articles. These data units were then categorized into the four core constructs of UTAUT. "Other" categorization system was also created for the data units that could not be classified into one of the UTAUT core constructs.

Among four core UTAUT constructs, Performance Expectancy is found to be the most influential factor in physicians' acceptance of PHR, followed by "Other" factors, Facilitating Condition and Social Influence. Effort expectancy was found to be the least influential. The identified specific factors within each domain can be used to develop a valid survey instrument to measure physicians' perception on PHR.

1. Introduction

Personal Health Record (PHR) is an evolving concept in health care. PHR offers the great potential to improve the quality of health care and prevent the medical errors by providing the complete information on an individual. (Tang et al. 2005)

Natural disasters, like Hurricane Katrina and the current economic conditions call for the need of having commonly accessible, comprehensive and longitudinal electronic PHR. The importance of having commonly accessible health record has been realized by government, employers, health care providers and individuals/consumers. President Barack Obama has recently signed a bill that has the provision for computerization of every American's health record in next five years. (HIMSS, 2009)

PHRs are primarily managed, controlled, and shared by the individuals. Consumers/patients primarily benefit from PHR; however, other stakeholders including health care providers, payers and purchasers of health care can also benefit from PHR use, as it reduces the cost of chronic disease management, medication and wellness activities. (Tang et al, 2005) Despite many advantages offered by PHR for patients, providers, and institutions, the adoption of PHR has achieved limited success. There are many barriers in the widespread adoption of

PHR. The major challenges identified by previous researchers are patients' or consumers' concern regarding the privacy and security of their health information. Access control i.e. who should have access to what, easiness of use and who should pay for the PHR are some of the common barriers in adoption of PHR. (Halamka et.el., 2008)

Additionally, integration of PHR into physicians' workflow, behavioral change, recognition of value of PHR by the providers, challenges to provider autonomy, (that is the belief that PHRs will threaten the control), and authority of some health care providers, based on traditional provider-patient roles, are also acknowledged as major barriers towards the adoption and use of PHR. (Tang et al., 2005)

The participation, acceptance and use of PHR by physicians are as necessary as the participation, acceptance and use by the patients. This is because the data within the PHR need to be collected from various healthcare providers including physicians. Therefore it is also important that health care providers give their patients electronic access to the health information and also use the information from PHR while making the decision on individuals' health. According to Tang et al. (2005), "While patient-entered segments are desirable for some information and only patients can provide some types of health data, clinicians must also have access to their own past considerations and interpretations, as well as reliable objective data, if they are to depend upon records for clinical decision-making." Previous researchers also mentioned that,

"Physicians will be the primary and leading health professionals in the movement toward optimal use of the PHR and engagement with consumers about their personal health information." (Fuji et al. 2008)

In response to a survey question in a consumer survey conducted by Health Industry Insights (2006), 21% respondents said that they started using the PHR because their providers recommended them. Therefore understanding and addressing healthcare providers' attitude towards the adoption of PHR is a key to achieving widespread implementation and use of PHR (Kaelber et.al. 2008). Comprehending the reasons why physicians' accept or reject the PHR system will allow healthcare organizations and policy makers to proactively take corrective action to increase acceptability.

2. Problem Statement

According to Kaelber et al. (2008) some studies suggest that physicians may be more reticent to adopt PHRs than other health professionals. This reticence is mainly due to the concerns about whether adoption of PHRs will create additional work that is not reimbursed. Another barrier which may hinder physicians' acceptance of PHR is resistance to change. (Clarke and Meiris, 2006)

Researchers have also observed that "Even if physicians are persuaded to extract information from a PHR, it will be difficult to convince them to enter information without appropriate incentives." (Clarke and Meiris, 2006)

Adoption of PHR requires the behavioral changes because it brings changes in the roles and responsibilities and business processes in the health system. (KPIHP, 2006)

Previous researchers also mentioned that behavioral changes are difficult, and these changes occur if there is a perceived value, if there is a perceived usefulness and if there is the motivation and organizational support to change. (Tang et. al., 2005)

Therefore it is important to measure physicians' perspective on usefulness of PHR, and also the value and trust they have in PHR usage. Comprehensive evaluation of physicians' perspective on acceptance and use of PHR is necessary for the successful implementation on PHR system. Comprehensive evaluation can only be performed by using a comprehensive instrument that covers all the domains necessary to measure an individuals' behavior towards the acceptance of an innovation. Literature identifies the lack of availability of a validated instrument that can evaluate physicians' perception on acceptance of PHR. According to a recent study conducted by Kaelber et al (2008), there is a need for research focusing on finding the factors associated with the acceptance and use of PHR.

2.1 Purpose of Study:

The objective of this study is to identify the factors (domains) that can be used in the development of comprehensive evaluation instrument for physicians acceptance of PHR. Using the integrated literature review methodology and Unified Theory of Acceptance and Use of Technology (UTAUT) as a guiding framework, this study will identify all different domains that need to be evaluated to understand physician perception on PHR.

2.2 Scope and Limitations

This study represents the first stage towards the instrument development that includes identification of domains using content analysis method. The actual development and validation of the instrument is beyond the scope of this study.

3. Background

3.1 Current Understanding of PHR

PHR enable individuals to gather and enter health related information from various sources across the different health care providers and store them at one place. It is a tool that empowers individuals to manage and own their health information, and it also allows them to actively participate in their own health care while assisting them in informed decision making. (NCVHS, 2005)

PHR systems offer a wide variety of features, including the ability to view personal health data, exchange secure messages with providers, schedule

appointments, renew prescriptions, and enter personal health data; decision

support (such as medication interaction alerts or reminders about needed

preventive services); the ability to transfer data to or from an electronic health

record; and the ability to track and manage health plan benefits and services.

(NCVHS, 2006)

There are different models of electronic PHR have been created based on

how they are defined and also depending on who maintains them, where they are

maintained and what information they include and who have access to them. The

Institution owned PHRs such as "PatientSite" offered by The Beth Israel

Deaconess Medical Center (BIDMC) and "Indivo" offered by Children's Hospital

Informatics Program (CHIP) at Children's Hospital Boston are some of the

examples of Institution based PHRs. Institution based PHRs are patient portals

which provide access to the patients with the information entered in physicians'

EHR system. These PHRs are developed by the hospital institution and are

provider-specific, they provide depth of information from that particular provider

and they may lack the information about the diagnosis and prescriptions from the

other providers. [Hassol et.al (2004), Earnest et.al (2004), Masys et.al (2002)]

There are a few PHRs that are payers owned which enable individuals to

track their medical encounters across multiple providers, but they may not have

the complete information. For example, the PHR may have the information that

patient visited to the doctor for a disorder and doctor ordered a test but it may not

indicate the test result. (HN Health Insurers, 2006)

Third party web based applications are also available now to the individuals to enter and access their health information. As the individuals are the only sources of input for the content of this kind of PHR, the accuracy of that information depends on the consumer's data entry skills and ability or willingness to keep the record up to date. (T. Van Deursen et.al, 2008)

3.2 Definitions of PHR

The adoption and use of PHR has been slow for many reasons. Until recently, there was lack of consensus definition and common understanding of term PHR among all stakeholders. Lack of consensus definition created an ambiguity in the meaning and common understanding of term PHR among all the stakeholders.

Many organizations and workgroups made the efforts in defining PHR. Markle Foundation (2003) defined PHR as

"An electronic application through which individuals can access, manage and share their health information, and that of others for whom they are authorized, in a private, secure, and confidential environment."

American Health Information Management Association (AHIMA) (2005) defined PHR as,

"an electronic, universally available, lifelong resource of health information needed by individuals to make health decisions. Individuals own and manage the information in the PHR, which comes from health care providers and

the individual. The PHR is maintained in a secure and private environment, with the individual determining rights of access. The PHR is separate from and does not replace the legal record of any provider."

In order to enable the immediate and future development of PHR, Health Information and Management Systems Society (HIMSS) had announced a working definition of PHR. According to HIMSS, ePHR is

> *"an electronic Personal Health Record ("ePHR") is a universally accessible, layperson comprehensible, lifelong tool for managing relevant health information, promoting health maintenance and assisting with chronic disease management via an interactive, common data set of electronic health information and e-health tools. The ePHR is owned, managed, and shared by the individual or his or her legal proxy(s) and must be secure to protect the privacy and confidentiality of the health information it contains. It is not a legal record unless so defined and is subject to various legal limitations."*

Recently, the National Alliance for Health Information Technology (NAHIT) had led an effort for the Office of the National Coordinator for Health Information Technology (ONC) to develop consensus-based definitions by seeking public opinion on proposed definitions for key health information technology terms which also includes PHR. According to this consensus based definition, PHR is

"An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared, and controlled by the individual." (NAHIT, 2008)

The most recent definition declared in HITECH ACT (2009) section 13407(f) (2), that came into existence towards the end of this research is as followed,

The term ''personal health record'' means an electronic record of PHR identifiable health information on an individual that can be drawn from multiple sources and that is managed, shared, and controlled by or primarily for the individual.

This consensus definition would bring the common understanding of the term PHR among all the stakeholders. The ambiguity of meaning of PHR and other Health IT (Health Information Technology) terms, (e.g. EHR, EMR, HIE, and RHIO) is a fundamental obstacle in the progress of health IT adoption. The differences in how a term is used can cause confusion and misunderstanding about what is being purchased, considered in proposed legislation, or included in current applicable policies and regulations. (NAHIT, 2008)

The most important feature of this consensus definition of PHR which distinguishes it from the EMR and EHR is that the information it contains is under the control of the individual. According to this definition, an individual is the

source of control of PHR but it also leaves the room for others who act in the individual's interest and these sources of interest may have a control over access to PHR. For instance, the sources that possess the access control include parents for dependent children or in later stage of life, children taking care of parents. This consensus definition of PHR also focuses on the portability of PHR According to the definition, having control also means that an individual's PHR can exist independently of the entity that sponsors it. This requirement for portability excludes models in which sponsors such as health insurers or health care providers give individuals access to health-related information that is dependent on the individual remaining with that sponsor. (NAHIT, 2009)

3.3 PHR Functionalities

In addition to the lack of common definition as a barrier in adoption of PHR, lack of common understanding of the features and functions necessary to create and manage an effective PHR has also hindered the adoption of PHR.

In an attempt to develop the common understanding of features and functionalities to be included in PHR-System, HL7 has recently developed a PHR-System Functional Model (PHR-S FM). This model distinguishes PHR and PHR-S and according to that distinction, "PHR is the underlying record that the software functionality of a PHR-System maintains." Additionally, PHR-S is "a patient centric tool that is controlled for the most part, by the individual. It should

be immediately available electronically, and able to link to other systems, either in a "pull-push" or "push-pull" method." (HL7, 2008)

This PHR-S FM is intended to provide functionality for individuals to collect and maintain a longitudinal view of their health histories by collecting the information from various sources such as providers, health plans and also from individuals themselves. As mentioned in PHR-S FM Overview, PHR-S includes administrative and/or clinical data, and access to many of advance directive information, advice on diet, exercise, and disease management. "A PHR-S would help the individual collect behavioral health, public health, patient entered and patient accessed data (including medical monitoring devices), medication information, care management plans and the like, and could be connected to providers, laboratories, pharmacies, nursing homes, hospitals and other institutions and clinical resources." (HL7, 2008)

3.4 Adoption of PHR

A survey was conducted recently by Markel Foundation to explore consumer perceptions about PHRs in the context of the entrance of Google, Intuit, Microsoft, Revolution Health and WebMD in the marketplace. (Markle Foundation (2008)) According to this survey, 79 percent or more of the American adults believe using an online PHR would provide major benefits to individuals in managing their health and health care services. Almost half of the public, 46.5

percent say they would be interested in using an online PHR service. This represents about 106 million adults.

The other survey conducted by Manhattan Research (2009), found that despite significant interest in the PHR, only seven million U.S. adults actually use PHRs. Prior survey conducted by Markle Foundation (2006) shows that, 96 percent of Americans think that "it is important for individuals to access all of their medical records to manage their own health." Also "97 percent think that "it's important for their doctors to be able to access all of their medical records in order to provide the best care." (Markle Foundation, 2006)

There is much discussion going on to understand the barriers in adoption of PHR. Interoperability due to lack of common standard, portability, privacy, security and confidentiality are identified as some of the major challenges towards the development of PHR. In a published article by Tang et al (2005), the broad range of barriers in adoption of PHR has been discussed. The authors of the Tang article have categorized these barriers as "environmental" barriers that include organizational, economic, legal, and privacy concerns; and "individual-level" barriers. As mentioned earlier, the barriers in adoption of PHR includes workflow models, behavioral change, and recognition of value by the patient and providers, and challenges to provider autonomy and authority of some health care providers.

3.5 Current Efforts towards overcoming the barriers

In addition to NAHIT efforts to develop consensus based definition of PHR and HL7 efforts to define the standard functionalities to be offered by PHR, government is also initiating efforts to promote overall Health Care IT adoption.

On February 17, 2009, President Barack Obama signed into law, the American Recovery and Reinvestment Act of 2009. It includes over $20 billion to aid in the development of a robust IT infrastructure for healthcare entities and to assist providers and other entities in adopting and using health IT. This aid addresses many of the important issues that can accelerate the adoption of health care information technology. Some of the major issues that have been addressed are: establishment of the committees to make the recommendations on policy and standard, provision for incentives to physicians for meaningful use of EHR, funding for implementation of certified EHR and privacy and security. In this Act, there is also a provision for having the right for an individual to have access to specific information about them in an electronic format.

3.6. Knowledge Gap

All the collaborative efforts by the government, NAHIT (The National Alliance for Health Information Technology) and HL7 and other such organizations as well as advancement in technology will help in development of an infrastructure and better health information technology applications. However, it is very important that both patients as well as providers accept and use PHR to

achieve the optimal benefits PHR functionalities claims to offer. In order for new implementation methods to be developed, a better understanding of how people will accept and use these information systems is required. Physicians' acceptance and use of health IT applications will determine the overall success of PHR implementation. There is a lack of understanding and comprehensive knowledge on the issues related to physicians' acceptance and use of PHR.

4. Theoretical Framework

According to (Hinkin, 1995), "While the adoption of information technologies by individuals and organizations has been an area of substantial research interest since the early days of computerization, research efforts to date have led to mixed and inconclusive outcomes. The lack of a theoretical foundation for such research and inadequate definition and measurement of constructs have been identified as major causes for such outcomes."

There are many published studies and validated tools related to the evaluation of acceptance and use of information technology innovation. Previous studies evaluated physicians' attitude towards use of computers and technology, as well as use of specific medical information systems. The theories developed in the psychology, sociology and information systems have often been used to understand the adoption of information technology. The variables from these theories such as locus of control (Wishard and Ward, 2002), self perceived computer ability (Stephens and Grigg, 1999), perceived knowledge (Brennan et.

al, 2000) and perceived usefulness, perceived ease of use, (Hu et al, 1999), motivation and many other have shown positive correlation with adoption of technology innovations in health care settings. Previous studies found that physicians are accepting information systems that improve job performance or patient care processes, but resists those that have a negative impact on their autonomy. (Anderson & Aydin, 1994; Teach & Shortliffe, 1981).

Several models exist to understand individual's intention to use information technologies. The widely used models are:

1. The Theory of Reasoned Action (TRA) (Fishbein and Aizen 1975); this model has been used to predict wide range of behavior. The core constructs in this TRA model are: attitude toward behavior (an individual's positive or negative feelings about performing the target behavior) and subjective norm (the person's perception that most people who are important to him think he should or should not perform the behavior).

2. The Technology Acceptance Model (TAM) (Venkatesh and Davis 2000); this model was designed mainly to predict the acceptance of information technology and its use. The core constructs in the original TAM are perceived usefulness (the degree to which a person believes that using a particular system would enhance his or her job performance), perceived ease of use (the degree to which using an innovation is perceived as being difficult to use). Later the TAM was extended by the authors by adding subjective norm as a construct to use as a predictor of intention in the case of mandatory settings.

3. The Motivational Model (MM) (Davis et al. 1992); this model was originated from motivation theory developed in psychology. The core constructs of this model are extrinsic motivations (the perception that users will want to perform an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions) and intrinsic motivations (the perception that user will want to perform an activity for no apparent reinforcement other than the process of performing the activity per se).

4. Theory of Planned Behavior (TPB) (Aizen 1991); this model is the extended model of Theory of Reasoned Action (TRA) and includes an additional construct of perceived behavioral control.

5. The Hybrid Model (C-TAM-TPB); this model combines the Technology Acceptance Model (TAM) and (TPB) the Theory of Planned Behavior (Taylor and Todd 1995).

6. The Model of PC Utilization (MPCU) (Thompson et al.1991); this model is derived from Triendis' (1977) theory of human behavior. The core constructs in this model are job-fit, complexity, long-term consequences, affect towards use, social factors, facilitating conditions.

7. The Innovation Diffusion Theory (IDT) (Rogers 1995); this model is grounded in sociology and had been used to study variety of innovations. The core constructs in this theory include, relative advantage, ease of use, image, visibility, compatibility, result demonstrability, voluntariness of use.

According to Venkatesh et al. (2003) all of these models routinely explain over 40 percent of the variance in individual's intention to use technology. Researchers who were intended to study the behavioral intention to use new technology often found the similarities of constructs between these multiple models and found that many times none of these models solely can help. They always wished to have the choice of 'Pick and Choose" the constructs across the models.

Venkatesh et al. (2003) compared 32 constructs across eight models and based on their similarities, they have formulated a unified view of user acceptance and developed UTAUT (Unified Theory of Acceptance and Use of Technology).

According to Venkatesh et.al, most of the eight models were tested well after the participants' acceptance or rejection decision rather than during the active adoption decision-making process. Some of them (Davis et al., 1989) performed the testing of the model after the users became familiar with the technology. UTAUT model is helpful in examining technologies from the time of their initial introduction to the stages of greater experience. It also tracks participants through various stages of experience with new technology. The UTAUT model also examines both voluntary and mandatory implementation contexts.

"UTAUT provides a useful tool for managers needing to assess the likelihood of success for new technology introductions and helps them understand the drivers of acceptance in order to proactively design interventions (including

17

training, marketing, etc.) targeted at populations of users that may be less inclined to adopt and use new systems." (Venkatesha et. al, 2003).

UTAUT is consisted of four core constructs which are direct determinants of the intention and use of technology. The definitions to these four core constructs and the basic constructs from which these core constructs have been derived are stated below.

1. Performance Expectancy:

Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance. This construct is derived by comparing the five root constructs from the eight models that found to be having the similarities in them, those root constructs are

i.   Perceived usefulness, "the degree to which a person believes that using a particular system would enhance his or her job performance" and it is derived from (TAM/TAM2 and C-TAM-TPB).

ii. Extrinsic motivation, "the perception that users will want to perform an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions (MM).

iii. Job-fit is described as, "how the capabilities of a system enhance an individual's job performance." (MPCU),

iv. Relative advantage (IDT), the degree to which using an innovation is perceived as being better than using its precursor.

v. Outcome expectations (SCT), "Outcome expectations relate to the consequences of the behavior."

2. Effort Expectancy

Effort expectancy is defined as the degree of ease associated with the use of the system. Three constructs from the existing models capture the concept of effort expectancy: perceived ease of use (TAM/TAM2), complexity (MPCU), and ease of use (IDT), Venkatesh and Morris (2000). Drawing upon other research Bem and Allen and others researchers (Bem and Allen 1974; Bozionelos 1996), suggest that effort expectancy is more salient for women than for men. As noted earlier, the gender differences predicted here could be driven by cognitions related to gender roles (e.g., Lynott and McCandless 2000; Motowidio 1982; Wong et al. 1985). Increased age has been shown to be associated with difficulty in processing complex stimuli and allocating attention to information on the job (Plude and Hoyer 1985), both of which may be necessary when using software systems.

The different constructs from which the effort expectancy is derived from are defined as follows:

i. Perceived Ease of Use (Davis 1989; Davis et al, 1989): The degree to which a person believes that using a system would be free of effort.

ii.   Complexity (Thompson et al. 1991): The degree to which a system is perceived as relatively difficult to understand and use.

iii.   Ease of Use (Moore and Benbasat 1991): The degree to which using an innovation is perceived as being difficult to use.

3. Social Influence:

Social influence is defined as the degree to which "an individual perceives that important others believe he or she should use the new system". Social influence as a direct determinant of behavioral intention and is represented as subjective norm in TRA, TAM2, TPB/DTPB and C-TAM-TPB, social factors in MPCU, and image in IDT.

i.   The Social influence is derived from the following constructs:Subjective Norm, (Ajzen 1991; Davis et al. 1989; Fishbein and Azjen 1975; Mathieson 1991): The person's perception that most people who are important to him think he should or should not perform the behavior in question.

ii.   Social Factors, (Thompson et al. 1991): The individual's internalization of the reference group's subjective culture and specific interpersonal agreements that the individual has made with others, in specific social situations.

iii.   Image (Moore and Benbasat 1991): The degree to which use of an innovation is perceived to enhance one's image or status in one's social system.

4. Facilitating condition:

Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. This definition captures concepts from three different constructs, perceived behavioral control (TPB/ DTPB, C-TAM-TPB). Facilitating conditions (MPCU) and compatibility (IDT).

Facilitating condition is derived from the following constructs:

i. Perceived Behavioral Control (Ajzen 1991; Taylor and Todd 1995a, 1995b): Reflects perceptions of internal and external constraints on behavior and encompasses self efficacy, resource facilitating conditions, and technology facilitating conditions.

ii. Facilitating Conditions (Thompson etal. 1991): Objective factors in the environment that observers agree make an act easy to do including the provision of computer support.

iii. Compatibility (Moore and Benbasat 1991): The degree to which an innovation is perceived as being consistent with existing values, needs and experiences of potential adopters.

Below is the diagrammatic/schematic view of UTAUT:

Figure 1. Unified Theory of Acceptance and Use of Technology Model (Venkatesh et al. 2003)
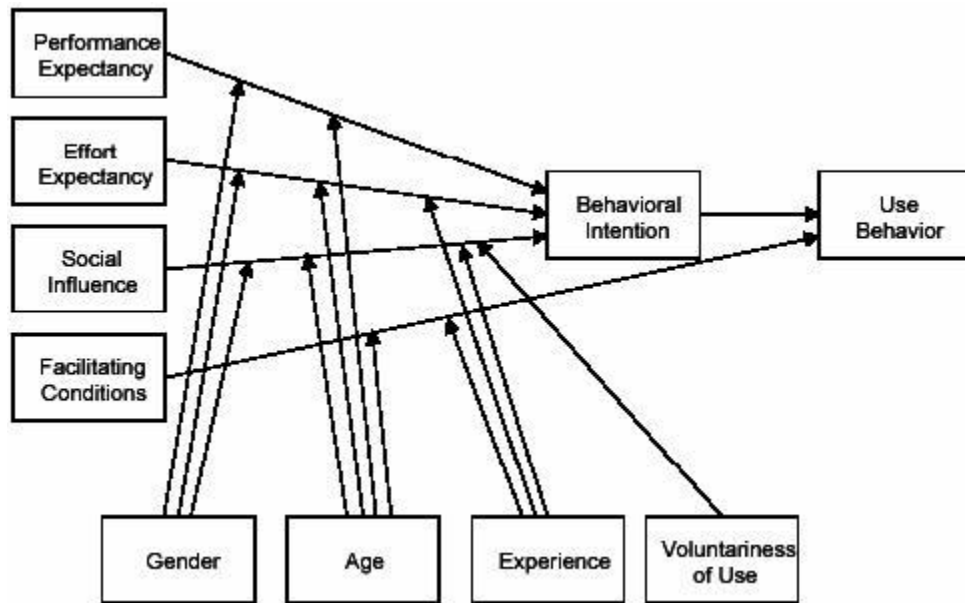
5. Methods

According to previous researchers, (Moore & Benbasat, 1991) the initial step in developing an instrument is identifying the domains that can measure all the dimensions of the variables. The purpose of domain identification is to clearly define "what" to be measured.

Using the literature review and content analysis methodologies, this study was aimed and limited to identifying the domains that can assess physicians'

perception on acceptance and use of PHR. An inventory of the identified domains will be presented as the result of this study.

5.1 Data Collection:

The literature review was performed to collect the data. According to Moore & Benbasat (1991); Lynn, (1986); Grant & Davis (1997) the domain identification is mainly performed by the literature search.

The following databases were searched: PubMed, Highwire Press, and CINHAL, "the Cumulative Index of Nursing and Allied Health Literature". The articles published between 01/01/1990 to 04/30/2009 have been selected. The rationale behind using this time criterion is that, this is the time when use of computer and internet began to become prevalent in general population. Again, for the purpose of this study, the investigator is just focusing on electronic PHR not the paper based PHR. Only, the articles that are published in peer reviewed journals such as JAMIA, JAMA, and BMJ etc. were included. The rationale behind selecting the articles only from the peer reviewed journals is that those articles are evaluated prior to the publication by the other people in the same field as the authors.

Only studies conducted in or related to United States were selected, because health care operations vary widely in different nations. The search was also limited to show only the articles published in English.

For the purpose of this study, the scope of the term physicians is limited to the "individuals licensed to practice medicine." The articles that explain physicians' view on any aspects or number of different aspects of PHR are included. For example, some of the articles that capture physicians' perception on email communication with patient are included because e-communication is a part of PHR since that communication can be saved by patients and providers into patient's chart and may be helpful in decision making and patient education.

The articles that solely capture patients' perception were excluded. Whereas, the articles that combine both patients' and physicians' perception were included, however, only the physician related units were extracted from those articles. For the purpose of this study, the scope of the term "attitude" is limited to "an enduring, learned predisposition to behave in a consistent way toward a given class of objects, or a persistent mental and/or neural state of readiness to react to a certain class of objects, not as they are but as they are conceived to be." Also, the articles that make any recommendations or conclusion describing physicians' perception have been included.

The first search was performed in CINHAL. The basic search term used was "Personal health record". CINHAL search resulted with a tree of search terms; the subheading from that tree selected was "Medical records, personal." This basic search resulted 110 articles, and after combining this term with "computerized patient record", it yielded 21 articles. The scope for the phrase "computerized patient record" is: Computer-based systems for input, storage,

display, retrieval, and printing of information contained in a patient's medical record. After further narrowing down the above search with the subject heading "physician-patient relationship" resulted only one article. Therefore, to provide the broad range, the previously retrieved 21 articles were considered for further review. The articles related to the physicians' perception on electronic health record or clinical information system were excluded.

PubMed search was performed using the similar criteria as mentioned above. The initial search was performed using the phrase "personal health record" and the closest match found in the resulted MeSH tree was "medical records, computerized." Therefore the Boolean search was performed using "medical record, computerized" and "physicians" and "attitude". This search resulted in a recall of 207 articles with a precision of 30.

Similar search was performed in Highwire Press using the phrase "Personal Health record" and also applied the same criteria mentioned above; the Pubmed journals were also included in this search. There were 227 articles retrieved from this search but many of them were similar with the articles that were found in PubMed and CINHAL search.

Since the nearest match to the phrase "computerized personal health record" and "electronic personal health record" in the MeSH browser was "medical record, computerized", many articles were found in the subject area electronic health record (EHR). Those articles were not included for the further review.

The searches have been completed by tracking the related articles and citations. After culling and skimming through the literature, 17 articles were found to be relevant. The selection was reviewed by the thesis advisor and based on the feedback 15 articles were finally selected for the data extraction (Appendix A).

The articles that were selected for the data collection included the research articles, viewpoints, survey, roundtable discussion (symposium discussion) etc. therefore it was important to describe which part in each articles the coders need to use for the data collection.

5.2 Data analysis:

Units of Analysis

Content analysis was used to analyze the extracted data. In content analysis, the undifferentiated data units are organized, classified, and edited to a manageable set of content categories (Weber, 1985; McLaughlin & Marascuilo, 1990; Patton, 1990; Ryan & Bernard, 2000; Neuendorf, 2002). "Content analysis is a summarizing, quantitative analysis of messages that relies on the scientific method (including attention to objectivity, inter subjectivity, a priori design, reliability, validity, generalizability, replicability, and hypothesis testing) and is not limited as to the types of variables that may be measured or the context in which the messages are created or presented". (Neuendorf, 2002).

The process is basically one of the selective reductions and involves a systematic and objective quantification of the observational data and the answers to open ended questionnaires according to mutually exclusive and exhaustive categories (McLaughlin & Marascuilo, 1990; Neuendorf, 2002).

Content analysis was performed in three steps. The first step is to identify the *unit of analysis*, 'data units' from the selected articles. The *unit of analysis* for this study was each idea or thought that describes physicians' perceptions/views on PHR and these units of analysis were extracted from the selected articles. The perceptions may include the following but are not limited: physicians' awareness/unawareness of PHR, the reasons for liking and disliking the PHR concept, the factors that influence or the factors that hinder them from sharing record with patients and accepting the shared data for medical decision making, physicians' decision on promotion or rejection of PHR etc. To further simplify the term perception, an operational definition was developed and synonyms of perception were explained to coders during the training session and were given to them in a written instruction sheet (Appendix B).

To identify the units of analysis from the selected articles, two independent coders including the investigator were involved. According to content analysis experts, a rigorous 'scientific' approach to content analysis requires that two or more coders be used to gain maximum reliability. According to Tinsley and Weiss (1975), even when a primary researcher conducts most of the research, a reliability subsample coded by a second or third coder is important

27

to ensure that "obtained ratings are not the idiosyncratic results of one rater's subjective judgments" (p. 359).

To train the coders and familiarize them with all the variables, a training session was coordinated with the help of thesis advisor and a common understanding of rules to identify and document the units of analysis was established. To maximize agreement the pilot coding was performed using a test article. The coded list was reviewed to ensure descriptions and instructions are clear.

'Blind coding' was performed by coders (i.e. neither coder should see coding of the others prior to completion of the assessment) to minimize 'demand characteristic' – a tendency of participants in a study to try to provide what the primary researcher wants or to skew results to meet a desired goal. (Macnamara, J. 2003)

The actual coding lists subsequently were compared for agreement in the determination of what an individual data unit consists of. Intercoder reliability was calculated to provide basic validations of the coding scheme. There are many different methods to measure the intercoder reliability; however, percent agreement is most commonly used index. (Lombard et al. 2003) Agreement is a simple comparison of the level of agreement between the coders' scores and ratings (Neuendorf, 2002). However, the reliability exceeding .75 to .80 is considered indicative of high reliability (Neuendorf, 2002), and 0.70 is also considered reliable by many researchers. (Frey, Botan and Kreps 2000) For the

purpose of this research, minimum of 0.70 inter-coder agreement was established

for the 'blind coding'. This means that from the total number of items extracted

by one coder should match with minimum 70% of the items that are extracted by

the other. The items that did not match were reviewed and discussed by both the

coders to come on consensus to include or exclude them before proceeding

forward. A master list of unique "data units" was generated as a result of first

step. (Appendix C).

Categorization of Data Units

The second step of content analysis is to create or use existing mutually

exclusive and exhaustive categories to sort the information into dimensions

(McLaughlin & Marascuilo, 1990). The use of existing systems for categorization

is preferred, but the creation of a categorization system is appropriate when

inquiring into unexplored research areas. In this study, both the methods are used.

If the identified units did not match with any of the four core constructs of

UTAUT model then it was decided to sort them into the "other" group.

McLaughlin & Marascuilo (1990) and Neuendorf (2002) recommend

using two independent analysts to perform the categorization in order to validate

the coding schema. In this study it was decided to employ two independent

analysts, different from the researcher. Again the instructional training was

provided to both the analysts. A training data set was created and used for

training. Data units (i.e. ideas) were sorted into a category according to their

semantic match to the UTAUT constructs definitions. A trial run was conducted

to make sure the analysts understand the construct definition and categorization process. During the trial run, it was found that the UTAUT core construct definitions do not cover the negative aspects of acceptance. Example, performance expectancy is defined "as the degree to which an individual believes that using the system will help him or her to attain gains in job performance." However, this definition does not cover lose associated with the adoption of innovation such as financial or popularity, efficiency etc. Therefore, for the simplification purpose the consensus based modification to the UTAUT construct definitions was performed by the analysts during a common discussion held by researcher in the presence of thesis committee chair. These simplified definitions were used for the categorization (Appendix D).

For each analysis performed, categorization was compared and intercoder reliability was calculated. The following formula was used to determine the percent agreement:

$$PAo = A/n$$

Where PAo = proportion agreement, observed, A= number of agreements between two coders, and n =number of identified distinct items (i.e. thoughts) in the analysis. The acceptance rate for intercoder reliability was again set to .70 or more. Disagreement was resolved through discussion and categorization was reviewed and redefined before proceeding. Although percent agreement is considered a crude measure, it does give an idea of how much agreement existed,

and it allowed measurement of intercoder reliability no matter how many categories used for each observation (Trochim, 1999).

Then in the third step, the similar items within each category were grouped together. The new anonymous sub categories were formulated by the analysts to further classify the identified units. The independent analysts were trained for this process as well. Again the reliability was set to .70 for each sub group and the disagreements were resolved with the discussion. The analysts were also asked to name and define each sub group during this discussion. The same formula was used to calculate the intercoder reliability.

6. Results

Final selection of 15 articles was given to the two independent coders to read and abstract the data units/items that describe the physicians' perception on PHR. Following the guidelines, coder A abstracted total 182 items and coder B abstracted total 209 items. After the abstraction was completed, the lists were returned to the investigator. Investigator closely studied the data units to find out the reason that caused the variance between the numbers of total items identified by each coder. It was found that coder B had divided some items into more than one items whereas coder A just kept it as one. For example: Coder B has separated the following item into 2 units which was identified by Coder A as single unit.

Table 1: Example of duplicate data units

Coder A	Coder B
2.13 Other barriers to PHR adoption involve legal concerns on the part of providers….Providers are wary of the legal implications of PHRs, which we don't yet understand. For example, courts might apply negligence standards in cases where practitioners rely on inaccurate patient-entered PHR information to make sub-optimal decisions about care.	**2.17** barriers to PHR adoption involve legal concerns on the part of providers **2.18** Providers are wary of the legal implications of PHRs

The initial agreement was matched and the duplicate items were not eliminated at this time, however they were kept under consideration while matching the similar items. Out of total 182 items abstracted by coder A, total 154 (84.61%) items matched with the coder B's item list. Similarly, out of 209 items abstracted by coder B, total 185 (88.52%) items matched with the items in coder A's list. The initial agreement exceeded the minimum % limit of 70 that was set for this research. Later on, all the unmatched items were discussed with the coders to achieve the 100% agreement. The seven items that both the coders did not

agreed upon and also the duplicate items were consensually eliminated during this discussion. A final list of 189 data units was created with 100% agreement between both the coders in the first phase. (Appendix A)

Table 2: Identified Units of Analysis

	Coder A	**Coder B**
Total number of items extracted by each coder using 15 articles.	182	209 *
Total agreement before discussion	154/182=84.61%	185/209= 88.52%
Agreement achieved after discussion.	175/182= 96.15%	198/209= 94.74
Total number of "Units of Analysis" upon 100% agreement= 189		

*Note: * means some items were duplicated; this coder divided many similar items into two. See the example in Table 1.*

The list was then given to two independent data analysts who were different than the coders in the first phase. Each of them independently

categorized the items within five categories with initial agreement of 68.89%

followed by 100% agreement upon the discussion. During the discussion session,

there were two initially extracted items which both the analysts agreed could be

separated into four items. Therefore, the total number of items that were extracted

in first phase reached to 189. The rationales behind initial agreement or

disagreement for each item were explained by each analyst and are included in the

categorization sheet. (Appendix E)

Out of total 189 items now, 103 (54.5%) items were categorized within

Performance expectancy. Only one item (0.53%) was categorized within Effort

Expectancy. Total seven items (3.70%) were categorized in Social Influence.

Facilitating condition had 33 items (17.46%). There were 45 (23.80%) items that

could not be categorized within any of the four core constructs of UTAUT

therefore they were categorized within "other" category.

Table 3: Categorization of data units (units of analysis) into core UTAUT constructs

Names of Constructs	Ratio of the number of items identified within each constructs/Total number of items identified for the analysis.
Performance Expectancy	103 (54.5%)
Effort Expectancy	1(0.53%)
Social Influence	7 (3.70%)
Facilitating Condition	33 (17.46%).
Other	45 (23.80%)

In the final phase, the items within each constructs were grouped into the common but anonymous themes. The initial agreement was calculated by the researcher by identifying the theme from Analyst A that has the maximum matches with the theme identified by Analyst B. There were nine themes (A1, A2…..A9) created by Analyst A in performance expectancy group and 11(SA1,

SA2, SA3….SA11) themes were created by Analyst B. During the initial

agreement calculation without discussion, there were 79 items out of 103 (77%)

that matched as common themes created by the analysts. Example, A1 was

matched against B1, B2 etc and the group that has most common items between A

and B was considered as match.

There was only one item in Effort Expectancy, therefore it did not require

sub grouping.

There were three themes created by Analyst A and two themes were

created by Analyst B for the seven items in Social Influence group. Out of those

seven items, total five items (71%) in two sub groups matched. Each analyst

created six themes for the Facilitating Condition. There were 25 items out of 33

(76%) that matched within these six sub groups.

The last group contained the items that couldn't be categorized initially

within any of the UTAUT constructs and was named as "Other" by the analysts.

For this "Other" category, Analyst A categorized them into five groups whereas

Analyst B has categorized it into nine groups. This group was too ambiguous to

match the sub categories without discussion. Therefore, the agreement for this

group has been calculated after the discussion only. (Appendix F)

During the discussion, analysts consensually named each theme based on

the similarities of the items. The 100% agreement on placing the items within

each theme was also achieved during this discussion. (Appendix G)

After the analysis and discussion was over, the researcher discussed the final list with the adviser. It was suggested by the adviser that the items within the "other" category can be reviewed and some of them could still be merged with the domains identified within the four core constructs. After the careful review, some of the domains within "other" category found to match with the identified domains within the four core constructs. The six items that were grouped in a domain of "physicians' view on sharing different elements within patient's chart" were merged with "record sharing" in the Performance Expectancy. "Determining reimbursement criteria" group was merged with the "reimbursement" domain in facilitating condition. The single item in "PHR will be useful only if integrated with EHR" domain was merged with "PHR adoption dependent on EHR adoption" within the Facilitating Condition.

Two domains within the "other" category, "Change in attitude after the actual use" and "Actual Use" were merged together to form one group. "Implementation and adoption only if ROI (Return on Investment) is observed" from the "other" category was placed in the facilitating condition.

The new list now contains 109 (57.67%) items in Performance Expectancy, 37 (19.58%) items in each Facilitating Condition and 35 (18.52%) items in "other" category with no changes in Effort Expectancy and Social Influence.

Table 4: Final categorization and identified domains

Performance Expectancy	Pt provider relationship	10
	Decision making	7
	Pt provider communication	24
	Useful (review it further if there is any other kind of usefulness)	9
	Impact on physician workload and or workflow	22
	Impact/changes in the documentation pattern or style	4
	Opinion/concerns about providing access to the pts	10
	Pt education	2
	Sharing the medication list	2
	Record sharing	19
	Total items in Performance Expectancy	109
Effort Expectancy	Extra security measures as barriers in accessing data at the time of need	1
	Total Items in Effort Expectancy	1
Social Influence	Physician supporting/not supporting patients to adopt PHR	4
	pt demand to access their health information through PHR	3
	Total 7 Items in Social influence	7
Facilitating Condition	Incentives	13
	Reimbursement	14
	Litigation concerns	5
	Value gain in the marketplace	1
	PHR adoption dependent on EHR adoption	3
	Total 36 items in facilitating condition	36
Other	Low use of PHR among physicians as compared to other healthcare professionals and patients	5
	Change in attitude after the actual use (positive change)	6
	Change management, criteria for adoption	4
	Physicians find seeing higher use of paper based PHR among their patients	4
	Positive/negative feelings for the adoption of PHR	5
	Gender specific (PHR adoption among physicians specific to the gender)	3
	Future research and recommendations to enhance the adoption of PHR	5
	Familiarity with the ePHR concept	3
	Implementation and adoption only if ROI is observed	1
	Total 37 items in "other" category	37

7. **Discussion**

The result of this study indicates that Performance Expectancy is the most influential factor for physicians' acceptance of PHR. A total of 57.7% of the items was identified in this major domain. Physician's belief that using the system will help him or her to attain gains/losses (i.e. financial, increase or decrease in patients, improvement of efficiency in job performance and ability to make work easier/difficult) has most impact on the adoption of PHR. The underlying domains that were identified within the performance expectancy are patient provider communication, patient provider relationship, decision making, patient education, sharing medical and demographic information with patient, and impact on workload and workflow.

This research found that PHR may impact patient-provider relationship. Some of the positive items found in this domain indicate that PHR has the potential to improve the patient-provider relationship and increasing the availability of information to the patients would increase their trust in doctors. The PHR has the additional potential to educate patients both about their condition, the process and the complexity of the care their doctors provide. Similarly, some items that indicate negative impacts of PHR on patient provider relationship are physicians worry that the patients would be offended, thus,

creating tension in the physician–patient relationship. Therefore it is important to evaluate this domain to fully understand the physicians' perception.

This study also identified the items with impact of PHR mediated e-mail communication on the traditional way of patient provider communication. The items that were extracted implicate that the email communication will facilitate the communication between patients and clinicians, it may avoid the telephone tag, and it is the best way to improve care and coordination, improved treatment monitoring in the chronic condition. It also found to have the potential to improve the cost and efficiency of personal contacts. On the other hand, some of the items have the implication of negative impacts such as physicians worry about getting flooded with the messages. Therefore the impact of PHR mediated email communication is an important domain to explore for understanding physicians' perception on this important aspect of PHR.

The performance expectancy also includes the patient education as an important domain to explore. Physicians seemed to be concerned about finding out the effectiveness of PHR on patient education. Some of the physicians noted that if the records are not intended for patient education then they are more likely to confuse patients.

Evaluation of physicians' perception on sharing different elements of patient's medical record is also important. There are several items found from the previous literatures that highlight physicians' view on sharing some demographic and clinical information with patients. The mixed opinion was found in sharing

the allergy data, lab and diagnostic test results, progress notes, clinical notes, medication and non medication order list with patients. Some physicians seemed to understand the value of sharing this information with patients because they think that patient has the right to examine entire medical chart and it is not a place for secret. Whereas, other physicians seemed to be reticent about sharing the information with their patients for several reasons such as, clinicians may use notes to record personal thoughts not intended to share with patients and because of the fear that sharing information with patients could result in a stream of phone calls and emails about abnormal but clinically insignificant results.

The results of this study also identified that Performance Expectancy also includes an important domain, the impact of PHR on physicians' workload and workflow. The items identified in this domain contain both positive and negative impact of PHR on physicians' workload and workflow. Some literatures have found increased workload and workflow disruption as major barriers in patient-physician email communication. Medical staff was concerned that they will have to spend more time in explaining the information to the patients when it is shared with them. Some studies discovered that physician fears that PHR implementation would increase workload seem to have been unfounded. It was also identified in previous literatures that the interactions between patients and medical professionals will likely improve because of PHR as practitioners will need to spend less time gathering patient history and be able to spend more time with patients probing deeper into concerns, questions, and clarification about their

conditions. Some physicians were also concerned that they may need to change the documentation pattern to make it more understandable to the patients. Therefore, thorough evaluation of this domain is very important in understanding physicians' acceptance to PHR.

There was only one item (0.53%) found in Effort Expectancy category. Effort Expectancy does not seem to have major impact on their acceptance and use of PHR. The item that was categorized in this domain was the concern that aggressive protection and security measures might hamper PHR access by patient and clinicians impeding optimal care. Effort Expectancy was found to be a major area of evaluation for understanding the adoption of EHR by physicians but not for the PHR acceptance. This may be because of the fact that the EHR is the basic infrastructure for PHR and Effort Expectancy has already been overcome during the adoption of EHR. However, Effort Expectancy is an important aspect that may need additional research.

Social Influence "the degree to which an individual perceives that important others/ other people (i.e. colleagues, friends, boss, superiors etc) believe he or she should/should not use the new system", was also found to be the area of exploration while understanding the physicians' acceptance and use of PHR. There were seven items (3.7%) out of total 189 items were categorized in this domain. Patients' interest in accessing their medical record was identified as reasonable by physicians and that was found to be an influential factor for them to provide access to the patients of their own medical record. It was also found that

physicians' recommendation for the use of PHR has an influence on patient's adoption to PHR.

Facilitating Condition, "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system and it is made attractive to them as users by providing any benefits or any penalty, an external benefit or detriment facilitates the adoption" was found to have great influence on physicians' acceptance and use of PHR. There are 37 items out of the total 189 items that were categorized within the underlying domains of facilitating condition. Incentives, reimbursement for the care provided through the online communication, litigation concerns, value gain in the marketplace, and EHR infrastructure as a requirement for PHR were the domains identified under facilitating condition.

The items that identify the need to address the policies on providing the incentives and pay-for-performance to compensate physicians for delivering professional services regardless of the media used for communication were extracted in this research from the literature review.

Reimbursement to the physicians for the care they provide through the electronic communication need to be evaluated for understanding their acceptance and use of PHR.

Physicians expressed readiness to increase email communication with patients in one of the studies if they were financially compensated for time spending in doing

so. One of the literatures has the item indicating that physicians may be more reticent to adopt PHRs than other health care professionals due to the concern that adoption of PHR will create additional workload that is not reimbursed. Another study also found the challenge of secure patient messaging revolves around legal liability and reimbursement for medical advice rendered online. Therefore, it is necessary to discuss the reimbursement criteria with physicians.

Literature also identified that the providers are wary of the legal implications of PHRs, this needs to be understood. For example, courts might apply negligence standards in cases where practitioners rely on inaccurate patient-entered PHR information to make sub-optimal decisions about care. Identifying and addressing this issue may have impact on physicians' acceptance and use of PHR.

EHR infrastructure has also been considered as one of the facilitating conditions for physicians' adoption of PHR. There was an item identified in this domain indicates that "physicians who are EHR users reported greater awareness of PHR use by their patients."

Competitive advantage in the marketplace is also identified as facilitating condition in acceptance of PHR by physicians. Previous researchers expect that, providers will recognize that paying for PHRs may give them a competitive advantage in the marketplace. More clarity on this domain needs to be identified.

Other important domains that could not be categorized within any of the UTAUT constructs but represent the important aspects of PHR in the physicians' context were also identified from this research. These domains include physicians' familiarity with the PHR concept, current status of PHR usage observed by physicians among their patients, positive/negative feelings for the adoption of PHR, change in attitude of physicians after they have implemented PHR, and change management.

It was identified in one of the items that a quarter of responding physicians were not familiar with PHRs, and in another item it was found that majority of physicians did not know if their patients keep any PHR. Therefore, familiarity with the PHR concept may have impact on adoption.

Change management involving PHR adoption was also identified as a domain to explore. Changes in the documentation pattern, way of communication, change in processes and workflow could be challenging and may have impact on PHR acceptance and use by physicians.

The physicians who were concerned before the PHR implementation for many reasons such as losing control over autonomy, increased workload and return on investment etc. seemed to change their opinions after the actual use and found the PHR a useful tool. Physicians seemed to be more positive than negative about the effect of the system and they found that providing access to the medical record to their patients is empowering and is useful in shared decision making.

Few items were found regarding the gender differences towards the PHR adoption. It was also found that more male physicians than the female physicians use the patient's PHR information and have their staffs engaged in working with patients and their PHR. The literature search could not find the PHR adoption differences for different age of physicians. However, this aspect has been found useful for evaluation of many other information technology innovations.

Items extracted from the Future Research Recommendation section of previous literature can also be used for the development of evaluation framework. Some important recommendations revolves around the reimbursement policies, workflow assessment and evaluating all the stakeholders' perceptions.

The UTAUT core constructs were the basis for this study. Many other valuable and insightful PHR related factors were identified using this basic structure.

8. Limitations

This study used the previous literatures for the data collection. There are limited numbers of research papers available on this subject. Therefore, other methodologies such as qualitative research by interviewing the physicians for collecting the data may uncover some other important domains that need to be evaluated for understanding physicians' perception.

This research included the literature from the studies that are conducted in United States, including the literature from other countries may highlight some additional domains that need to be evaluated.

9. Future research recommendations

Development of a valid survey instrument using the identified domains in this study can be a next step towards the actual evaluation of physicians' perception. The results from actual evaluation of physicians' perception on PHR then can be used towards developing the policies and better PHR tools that offers the meaningful functionalities.

10. Conclusion

Performance expectancy or the usefulness of PHR is found to be a major driver for physicians' acceptance and use of PHR. Facilitating conditions such as incentives, reimbursement, litigation concerns are other important factors towards the physicians' adoption and use of PHR. Thorough evaluation of physician perception using the identified items from this study will help sketching the clear picture and implementing the meaningful PHR.

11. References

(2001) Committee on Quality of Health Care in America, Institute of Medicine. "Crossing the Quality Chasm: A New Health System for the 21st Century." Washington, DC: National Academies Press.

(2003) Markle Foundation. "Connecting for Health: the personal health working group, final report." http://www.markle.org/downloadable_assets/final_phwg_report1.pdf.

(2004) Harris Interactive. "Two in five adults keep personal or family health records and almost everybody thinks this is a good idea." http://www.harrisinteractive.com/news/newsletters/healthnews/HI_HealthCareNews2004Vol4_Iss13.pdf.

(2004) Markle Foundation. "Connecting for Health: working group on policies for electronic information sharing between doctors and patients, final report." http://www.connectingforhealth.org/resources/wg_eis_final_report_0704.pdf

(2005) Letter to Department of Health and Human Services Secretary Michael Leavitt. http://www.centerforhit.org/PreBuilt/chit_phrleavittltr.pdf.

(2005) National Committee on Vital and Health Statistics. "Personal Health Records and Personal Health Record Systems." http://www.ncvhs.hhs.gov/050909lt.htm

(2005). "Practice brief. The role of the personal health record in the EHR." Journal Of AHIMA / American Health Information Management Association **76**(7): 64A-64A.

(2006) Markle Foundation. "Attitudes of Americans regarding personal health records and nationwide electronic health information exchange."
http://www.markle.org/downloadable_assets/research_release_101105.pdf

(2008). "Medicare to test an electronic Personal Health Record (PHR) in South Carolina." South Carolina Nurse (Columbia, S.C.: 1994) **15**(2): 21-21.

(2008). "OptumHealth creates lifetime PHR." Disease Management Advisor **14**(4): 5.

Ackerman, M. J. (2007). "The personal health record." The Journal Of Medical Practice Management: MPM **23**(2): 84-85.

Ball, M. J., M. Y. Costin, et al. (2008). "The personal health record: consumers banking on their {Halamka J, 2007 #1;Deitz, 2004 #2}health." Studies In Health Technology And Informatics **134**: 35-46.

Burrington-Brown, J., J. Fishel, et al. (2005). "Defining the personal health record. AHIMA releases definition, attributes of consumer health record." Journal Of AHIMA / American Health Information Management Association **76**(6): 24-25.

Chau, P.Y.K., Hu, P.J. (2002). "Investigating healthcare professionals' decisions to accept telemedicine technology: an empirical test of competing theories." Information & Management 39 (4)

Clarke J.L, Meiris D.C, Nash D.B, (2006) "Electronic personal health records come of age." American Journal of Med Quality. **21**(3 Suppl):5S–15S.

Davis F.D, Bagozzi R.P, Warshaw P.R, (1989) "User acceptance of computer technology: a comparison of two theoretical models." <u>Management Science.</u> **35** (8) 982–1002.97–311.

Davis, F.D. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology." <u>MIS Quarterly</u> **13**, (3). 319-340.

Davis. F.D. (1993) "User acceptance of information technology: System characteristics, user perceptions and behavioral impacts." <u>International Journal of Man-Machine Studies</u> **38**, (3), 475-487.

Deitz, D, Hassol, A., Kidder, D., Kuck, S., Ortiz, E., Pierdon, S., Rokita, K., Walker, J.M., Young, D. (2004) "Patient Experiences and Attitudes about Access to a Patient Electronic Health Care Record and Linked Web Messaging." Journal American Medical Informatics Association. Vol 11:505-513.

Denton, I. C. (2001). "Will patients use electronic personal health records? Responses from a real-life experience." Journal Of Healthcare Information Management: JHIM 15(3): 251-259.

Department of Health and Human Services. Strategic framework: the decade of health information technology: delivering consumer-centric and information-rich health care. Available at: http://www.hhs.gov/healthit/frameworkchapters.html. Accessed March 29, 2006.

Earnest, M.A. MD, PhD, Lin, C. MD, Moore, L.A., MPH, Ross, S.E., MD, and Wittevrongel, L. BA. (2004) Use of a Patient-Accessible Electronic Medical Record in a Practice for Congestive Heart Failure: Patient and Physician

Experiences. The Journal of the American Medical Informatics Association. Vol 11(5)

Eveillard, P. (2004). "[The electronic personal health record: the spirit of the law of March 4, 2002]." La Revue Du Praticien **54**(17): 1861-1864.

Feather, J., C. A. Misselbrook, et al. (1987). "Evaluation of a personal health record given to newborns in saskatoon canada." Canadian Journal of Public Health **78**(5): 350-351.

Fishbein, M., and Ajzen, I. (1975). "Belief Attitude, Intention and Behavior: An Introduction to Theory and Research." Reading, MA: Addison-Wesley.

Frey, L., Botan, C., & Kreps, G. (2000). Investigating communication: an introduction to research methods (2nd ed.). Boston: Allyn & Bacon.

Fuji K.T., K.A. Galt, A.B. Serocca, (2008). "Personal Health Record Use by Patients as Perceived by Ambulatory Care Physicians in Nebraska and South Dakota: A Cross-Sectional Study." Perspectives in Health Information Management 5,(15)

Galloway, G. (2006). "Getting personal. The personal health record is a key element in attaining the complete patient medical record." Healthcare Informatics: The Business Magazine For Information And Communication Systems **23**(11): 45-46.

Green LA, Fryer GE, Yawn BP, Lanier D, Dovey S.M (2001). "The ecology of medical care revisited." New Engl J Med.344:2021-2025.

Halamka, J. D., K. D. Mandl, et al. (2008). "Early experiences with personal health records." Journal Of The American Medical Informatics Association: JAMIA **15**(1): 1-7.

http://definitions.nahit.org/doc/HITTermsFinalReport_051508.pdf

http://www.infoworld.com/article/06/12/13/HNhealthinsurers_1.html

http://www.manhattanresearch.com/newsroom/Press_Releases/high-interest-little-
participation-in-phr.aspx

Kaelber D.C, Jha A.K, Johnston D.B, Middleton D, Bates W, (2008). "A Research
Agenda for Personal Health Records (PHRs)." Journal Of The American Medical
Informatics Association: JAMIA **15**:729 –736.

Lombard, M., Synder-Duch, J., & Bracken, C. C. (2003). Content analysis in mass
communication: assessment and reporting of intercoder reliability. Human
Communication Research, 29, 469-472.

Macnamara, J. (2003). Mass media effects: a review of 50 years of media effects
research.

Neuendorf, K. (2002). The Content Analysis Guidebook, Thousand Oaks, CA: Sage
Publications.

Kim M.I, Johnson K.B. (2004) "Patient entry of information: evaluation of user
interfaces." J Med Internet Res. **6**:e13.

 Masys D, Baker D, Butros A, Cowles KE.(2002) Giving patients access to their medical
records via the Internet: the PCASSO experience. J Am Inform Assoc. 9:181-191.

Moore, G.C., and Benbasat, (1991) "Development of an instrument to measure the
perception of adopting an information technology innovation." Information
Systems Research. **2**, (3); 192-223.

Rogers, E,M. (1995). Diffusion of Innovations, 4th ed. New York; Free Press.

Tang PC, Lansky D. The missing link: bridging the patient-provider health information gap. Health Aff. 2005; 24:1290-1295.

Tang, P. C., J. S. Ash, et al. (2006). "Personal health records: definitions, benefits, and strategies for overcoming barriers to adoption." <u>Journal Of The American Medical Informatics Association: JAMIA</u> **13**(2): 121-126.

Van Deursen T, Koster P, Petkovic, M. (2008) "Reliable Personal Health Record." Studies in Health Technology and Informatics.136: 484-9.

Venkatesh V., Morris, M.G, et al. (2003). "User acceptance of information technology: toward a unified view." MIS Quarterly 27 (3) 425–478.

Wolter, J. and B. Friedman (2005). "Health records for the people. Touting the benefits of the consumer-based personal health record." <u>Journal Of AHIMA / American Health Information Management Association</u> **76**(10): 28.

12. Appendices

Appendix A: List of the articles selected for the literature review and data extraction

No.	Title of the selected articles	Authors	Type of article	Journal published
1	A Research Agenda for Personal Health Records (PHRs)	DAVID C. KAELBER, MD, PHD, ASHISH K. JHA, MD, MPH, DOUGLAS JOHNSTON, MTS, BLACKFORD MIDDLETON, MD, MPH, MSC, DAVID W. BATES, MD, MSC	Viewpoint Paper	**J Am Med Inform Assoc.** 2008;15:729 –736. DOI 10.1197/jamia.M2547.
2	Personal Health Records: Definition, Benefits, and Strategies for Overcoming Barriers to Adoption	Paul C. Tang, MD, MS[1], Joan S. Ash, PhD[2], David W. Bates, MD[3], J. Marc Overhage, MD, PhD[4], Daniel Z. Sands, MD, MPH[5, 6]	White Paper. Strategy making, College Symposium discussions	**J Am Med Inform Assoc**. 2006;13:121-126. DOI 10.1197/jamia.M2025
3	Governance for Personal Health Records	SHANE R. RETI, MBCHB, HENRY J. FELDMAN, MD, CHARLES SAFRAN, MD	Viewpoint Paper	**J Am Med Inform Assoc.** 2009;16:14–17. DOI 10.1197/jamia.M2854.
4	Early Experiences with Personal	JOHN D. HALAMKA, MD, KENNETH D.	Viewpoint Paper	**J Am Med Inform Assoc.** 2008;15:1–7. DOI 10.1197/jamia.M2562.

	Health Records	Mandl, MD, MPH, Paul C. Tang, MD		
5	Proposed Criteria for Reimbursing eVisits: Content Analysis of Secure Patient Messages in a Personal Health Record System	Paul C. Tang, MD, MS, William Black, MD, PhD, Charles Y. Young, PhD	Research paper	AMIA Annu Symp Proc. 2006; 2006: 764–768.
6	Use of a Patient-Accessible Electronic Medical Record in a Practice for Congestive Heart Failure: Patient and Physician Experiences	Mark A. Earnest, MD, PhD, Stephen E. Ross, MD, Loretta Wittevrongel, BA, Laurie A. Moore, MPH, Chen-Tan Lin, MD	Research Paper	J Am Med Inform Assoc. 2004;11:410–417. DOI 10.1197/jamia.M1479
7	The Effects of Promoting Patient Access to Medical Records: A Review	Stephen E. Ross, MD, Chen-Tan Lin, MD	Review Paper	**J Am Med Inform Assoc.** 2003;10:129–138. DOI 10.1197/jamia.M1147
8	The Missing Link: Bridging Tie Patient-Provider Health information Gap	Paul C. Tang and David Lansky		*Health Affairs*, 24, no. 5 (2005): 1290-1295
9	Integrated Personal Health Records: Transformative Tools for Consumer-Centric Care	Don Detmer, Meryl Bloomrosen, Brian Raymond and Paul Tang	Roundtable discussion summary	*BMC Medical Informatics and Decision Making 2008, 8:45 doi:10.1186/1472-6947-8-45*
10	Personal health records: key adoption issues and implications for management	Mahesh S. Raisinghani and Erika Young	Research paper	*International Journal of Electronic Healthcare 2008 - Vol. 4, No.1 pp. 67 - 77*
11	Project HealthDesign: Stimulating the	Patricia Flatley Brennan, RN, PhD1; Stephen Downs,	AMIA Symposim article	AMIA Annu Symp Proc. 2007; 2007: 70–74.

	Next Generation of Personal Health Records	SM2, Gail Casper, PhD, RN1; Daniel Kenron, BSIE1		
12	Personal Health Record Use by Patients as Perceived by Ambulatory Care Physicians in Nebraska and South Dakota: A Cross-Sectional Study	*Kevin T. Fuji, PharmD; Kimberly A. Galt, PharmD, FASHP; and Alexandra B. Serocca, B.A.*	Research paper	Perspectives in Health Information Management 5;15, Fall 2008
13	A Patient-Controlled Journal for an Electronic Medical Record: Issues and Challenges	Jonathan S. Wald, Blackford Middleton, Amy Bloom, Dan Walmsley, Mary Gleason, Elizabeth Nelson, Qi Lia, Marianna Epstein, Lynn Volk, David W. Bates,	Research Report	
14	Primary care physician attitudes towards using a secure web-based portal designed to facilitate electronic communication with patients	Kittler AF, Carlson GL, Harris C, Lippincott M, Pizziferri L, Volk LA, Jagannath Y, Wald JS, Bates DW.	Research paper	Informatics in Primary Care 2004;12:129–38
15	Physicians' Attitudes regarding Patient Access to Electronic Medical Records	David A. Dorr, MD1, Belle Rowan, RN, BSN,2 Matt Weed, MBA,2 Brent James, MD, MS,2 and Paul Clayton, PhD2	AMIA Symposium article	AMIA Annu Symp Proc. 2003; 2003: 832

Appendix B: Phase 1- Data extraction Instruction

Objective of Content analysis:

The objective of content analysis is to find out physicians' perception towards their acceptance of any type of electronic health record – including EMR, EHR and/or any kind of electronic PHR -that is shared between physician and patient. This also includes their perception on e-communication, medical record or piece (part) of medical record sharing through patient portal; record shared using any electronic devices such as thumb drive/ smart card, or online record sharing etc.

For the purpose of this study, we need to find out physicians' perception/view on the PHR. The perception will be regarding their awareness/unawareness, the reasons for liking and disliking of PHR concept, the factors that influence or the factors that hinder them from sharing record with patients and accepting the shared data for medical decision making, their decision on promotion or rejection of PHR etc. The examples of these factors may include incentives or disincentives, litigation concerns, technical infrastructure, organization pressure or patient demand etc.

The synonyms for Perception are: Insight, awareness, view, acuity, discernment, observation, sensitivity, opinion, sense etc.

Examples of themes/ ideas that may indicate physicians' perception:

Assist in Decision making

Improve the Quality of care

Patient education or patient will be more worried etc

Impact on Relationship, communication

Incentives

Workload/ time saving/ time consuming

Reliability or validity of the data

Training

Computer literacy

Technical challenges

Infrastructure (Having EHR in place for easy sharing)

Training

Organization support

Patient demand

Political demand

Organizational demand

Market demand

Competition

Prestige/visibility

Units of Analysis:

Each perception extracted from the selected articles is considered a unit of analysis for the study.

Method:

Phase 1:

The articles will be provided as hardcopy or electronically as preferred by the individuals. Along with each article, a coding sheet will be attached. Please copy and paste the selected texts that are associated with physicians' perception in the article. The data may be embedded in the form of survey of the physicians, discussion among the expert panel, recommendations from the previous research etc. Articles may contain patients' perception as well but our focus is just to find out physicians' perception.

Both the individuals will read the articles independently and find out the units of analysis.

Important Note:

Please do not extract any texts or units of analysis from Introduction, background and methods sections of the given articles; we will include results, conclusion and discussion section for finding the units.

Appendix C: Master list of the Items/Units of Analysis extracted from the literature

	Items or Units of Analysis
1	PHRs have the potential to dramatically improve the patient-provider relationship
2	PHRs have the potential...enhance...shared decision making
3	Understanding and addressing attitudinal and physical adoption barriers among patients and healthcare providers represents an important key to achieving widespread implementation and use of PHRs.
4	Nevertheless, some studies suggest that physicians may be more reticent to adopt PHRs than other health professionals, due to concerns about whether adoption of PHRs will create additional work that is not reimbursed.
5	Less information is available about provider attitudes toward PHRs
6	Research on adoption and attitudes should focus on factors associated with attitudes, adoption, and use,
7	studies suggest that physicians may be more reticent to adopt PHRs than other health professionals
8	Studies also report low use among providers
9	Each constituency—patients, providers (physicians and non-physicians), payers, pharmacies, labs, etc.—must have sufficient incentives in order for them to be willing to participate in a PHR,
10	For provider groups which develop PHRs, there must be sufficient revenue or other return on investment to justify implementing and providing support for the PHR.
11	non-visit care is not generally reimbursed, so strong incentives exist for providers to delay PHR implementation, even if they already have an EHR with PHR functionality
12	secure e-mail between patients and providers improved the ease and quality of communication.
13	Having more data helps clinicians to make better decisions.
14	The PHR may also become a conduit for improved sharing of medical records
15	asynchronous, PHR-mediated electronic communication between patients and members of their healthcare teams can free clinicians from the limitations of telephone and face-to-face communication, or improve the efficiency of such personal contacts.
16	all the advantages of PHRs for providers depend on the PHR being integrated with the provider's EHR.

17	Hopefully, providers will recognize that paying for PHRs may give them a competitive advantage in the marketplace.
18	Small incentives to healthcare providers may be enough to encourage them to adopt EHRs that link to PHRs.
19	Many of the putative financial benefits of PHRs only occur when PHRs are tightly integrated with EHRs, so that seed funding of PHRs in practices that operate an EHR might advance PHR adoption to the "tipping point."
20	physicians demands for remuneration may be higher
21	Although data provided by patients can inform providers' decision-making, not all patient-supplied data will do so, and the volume of "clinically irrelevant" information in their patients' PHRs might become overwhelming for a healthcare provider to review.
22	Other barriers to PHR adoption involve legal concerns on the part of providers….Providers are wary of the legal implications of PHRs, which we don't yet understand. For example, courts might apply negligence standards in cases where practitioners rely on inaccurate patient-entered PHR information to make sub-optimal decisions about care.
23	While consumers appropriately desire protection of their private health information, aggressive protection measures might hamper PHR access by patients and clinicians and impede optimal care.
24	It is possible that PHRs will threaten the control, autonomy, and authority of some health care providers, based on traditional provider-patient roles.
25	Providers and patients will need to develop different mindsets and levels of trust.
26	Providers must learn to encourage patients to enter the information accurately, and to trust that information appropriately.
27	For PHR adoption, change management issues involve providers, consumers, and regulators
28	Participants elucidated the potential of PHR systems to transform patient-provider relationships,
29	The more comprehensive the data contained in a PHR, the more useful it will be to...care providers
30	The developers and users of EHRs and PHRs must understand individuals' and clinicians' mental models of healthcare processes, and the related workflows.
31	organizational and behavioral issues can delay PHR adoption. Barriers exist both at the environmental level and at the level of individual health care professionals and consumers.
32	The broad purpose for personal health records is to facilitate communication between clinicians and patients.
33	We propose a governance model with five functions and roles that recognize clinicians and patients as key stakeholders and include them as members. • Information/Assessment Capacity • Policy Formulation & Planning • Social Participation & Responsiveness Accountability • Clinical Leadership
34	sharing problem list...supported by clinicians debated sharing problem list entries which are considered highly private with patients online
35	We all share full text descriptions of problems rather than simple ICD9 codes.

36	included debate about several issues… We debated the sharing of psychiatric diagnoses such as Schizophrenia or Munchausen's. Would sharing such detail impede patient therapy or erode trust in clinicians?
37	The decision-making process to share all problem list entries included debate about several issues…Clinicians also debated sharing problem list entries which are considered highly private with patients online i.e., sexually transmitted diseases, HIV, and substance abuse treatment.
38	All three of our organizations made the decision to share the entire medication list. As with the problem list, no complaints have been received via the formal feedback mechanisms used for communicating issues to our application support staff.
39	Clinicians debated showing medications for HIV, substance abuse treatment and psychiatric treatment.
40	Enabling patients to reconcile their own medications via a PHR is a powerful way for providers to meet Joint Commission outpatient medication reconciliation requirements, which necessitate asking the patient about active medications to ensure the medication list is accurate at each site of care.
41	We all agreed to share full allergy data with patients.
42	We all agreed to share all laboratory and diagnostic test results with patients except those restricted by state law.
43	If possible, it is useful to have a provider review test results prior to its becoming available for the patient—if they can be reviewed in a timely manner. Giving the provider a chance to annotate, explain, or deliver the results verbally (especially when the results are abnormal) can enhance the communication of the results and the patient's understanding of them.
44	Early in the implementation of PatientSite, some clinicians were reluctant to share results with patients, fearing that sharing information with patients could result in a stream of phone calls and emails about abnormal but clinically insignificant results.
45	Should All Laboratory and Diagnostic Test Results Be Shared with the Patient?
46	Laboratory and diagnostic tests results may present bad news to a patient—a first time diagnosis, a recurrence of a disease or a worsening existing condition.
47	Should the PHR Include Secure Clinician/Patient Messaging?...... The challenge of secure patient messaging revolves around legal liability and reimbursement for medical advice rendered online.
48	physicians were concerned that they would be flooded with messages…....Our data do not support this.
49	Should Clinical Notes Be Shared with the Patient?.....Ultimately the patient has the right to examine the entire medical chart, including progress notes. However, the level of explanation required to help the patient understand their contents impedes sharing clinician notes with patients. Currently, most PHRs do not include progress notes for this reason.
50	To add to the complexity some clinicians in our institutions have said they would share some notes with some patients, but not all notes with all patients.

51	Other reasons for reluctance to share notes include the fact that clinicians may use notes to record personal thoughts, not intended to share with patients. Some clinicians may be willing to write notes with patient sharing in mind, but clearly note sharing must be configurable by each note author.
52	BIDMC sought approval of leaders in the psychiatry department, who agreed that sharing the full detail of problem lists/ diagnoses but not full text psychiatric notes with the patient would be an appropriate approach that would likely encourage helpful discussion between providers and patients.
53	One of the major impediments to physician adoption...is a lack of reimbursement
54	payers are interested in taking advantage of electronic clinical messaging dilemma is how to determine which communication involves sufficient data-gathering, to qualify for reimbursement
55	We proposed a set of criteria that is nearly identical to the office-based E&M coding criteria and have tested the feasibility of applying such criteria to a random sample of actual online patient messages occurring through PAMFOnline.
56	criteria were easy to apply consistently
57	a reimbursement strategy must be designed to compensate providers for their investment in technology to compensate providers and the delivery of professional services online
58	Sharing data and creating a robust communication strategy to link all members of the health care team, including the patient, may be the best way to improve care, improve coordination, and reduce costs.
59	The 22% of electronic messages directed to physicians that met the eVisit criteria seemed appropriate since messages that do not specifically require physician professional services can be self directed by patients to other administrative communication channels available through PAMFOnline.
60	modest increase in cost...offset by a reduction in office visit claims
61	A fair method of compensating physician professional time for rendering care online is needed.
62	Physicians expectations...Before the trial period, physicians were mixed in their opinions about providing patients online access to their records.
63	Physicians were more likely to anticipate concerns (particularly that access to records would increase patient worry and that patients would find laboratory and x-ray reports confusing).
64	Physicians expectations...All predicted that the intervention would not change hard outcomes (such as mortality, cardiac events, and hospitalization), their decision making, or their relationships with their patients.
65	although initially fewer than half of the physicians anticipated that access to medical records would be patient empowering, at the conclusion of the study all physicians did.
66	Physicians expectations...Some physicians were concerned that by bypassing them as information gatekeepers, online access to records would distort the clinical encounter. It might create the expectation that patients should set the clinical agenda, forcing the doctor to address patients' issues with the record, distracting the doctor from more important issues.

67	Physicians expectations...Others felt that increasing the availability of information would increase trust in the doctor–
68	Physicians expectations...Physicians wondered how effective medical records would be at educating patients. Some noted that because the record is not intended for patient education, it is more likely to confuse
69	Physicians expectations...Others felt that it would educate patients both about their condition and the process and complexity of the care they provide.
70	Physicians expectations...Whether patient access to records would increase or decrease…..errors was another concern.
71	Physicians expectations...Others hypothesized that patients would identify and correct inaccuracies in their records
72	Physicians expectations...Others….noted that physicians might be more compulsive in their record keeping, knowing that patients might be reviewing their records later.
73	Physicians expectations...Physicians were also concerned about how patients would respond to reading sensitive information about substance use,
74	Physicians expectations...Physicians were also concerned about how patients would respond…...psychiatric illness,
75	Physicians expectations...They worried that patients would be offended, thus, creating tension in the physician–patient relationship.
76	Physicians expectations...Others felt that candor was always best and that the record was ''not a place for secrets
77	Physician Experience….The principal change in the providers' attitudes after the trial period was that their concerns about potential deleterious effects from giving patients access to their records were largely gone.
78	In the interviews after the trial period, none of the participating physicians voiced any of the concerns that they mentioned in the initial interviews.
79	The consensus opinion was that the SPPAROproject was invisible from their perspective.
80	In practice, they were unaware of the intervention and did not feel it affected their workflow
81	In practice, they were unaware of the intervention and did not feel it affected …...or their relationship with their patients
82	With one exception, none of the physicians felt that any of these interactions were problematic (confusing, worrisome, overly time consuming, or embarrassing) in any way; instead, they recalled them in a positive light.
83	Four of the seven physicians did not notice any lasting change in their style of documentation.
84	Three physicians felt that they had changed their documentation style somewhat to make it more understandable to the patients.
85	None of them viewed that as a problem, and none felt that it cost them a significant amount of time:
86	Of the three who changed their documentation, each felt that this was a positive outcome. One felt that it would improve the level of honesty in the medical record:
87	All the providers considered patients' interest in their medical records to be understandable and reasonable.

88	Two offered unqualified support, citing their belief that patients were more involved in their care and benefited from more information.
89	None felt that patients should be denied access or that facilitating patient access to records was intrinsically a bad idea.
90	They wondered if their experience would be replicated in a practice with fewer personnel resources, a higher patient volume, and a less-sophisticated patient population.
91	Each questioned whether the merits of the intervention would warrant the resources spent on it
92	One was concerned that it might exacerbate disparities in care, noting that such systems are more likely to be used by socioeconomically advantaged patients and may lead to those patients claiming a disproportionate share of the doctors' time
93	physicians expressed concerns initially they viewed patient-accessible records much more favorably after none of these concerns materialized
94	all agreed that they were in favor of giving patients direct access to their test results and clinical notes…
95	Physicians and professional raters have analyzed medical and psychiatric case notes to see whether they are appropriate for patients to read.
96	most physicians believed that patients requested to read their records for "further treatment, education, or additional information,"
97	Although no quantifiable benefits in patient-provider communication were shown in a nonrandomized controlled trial of medical inpatients, there were "numerous individual instances" in which access to the medical record prompted doctor and patient to have "useful discussions
98	staff had the impression that patient access to the records changed documentation patterns
99	80% reported that access to records gave them more confidence in doctors and made them feel better understood
100	The psychiatric case notes appeared to be even more problematic—among records that were legible, roughly 80% contained entries that were potentially puzzling, offensive, alarming, or upsetting, as determined both by practitioners and patients
101	When medical staff members are interviewed about the impact of providing medical records to patients, a frequent concern is the time that they will spend explaining it to patients.
102	In most studies, however, merely giving the patient access to his or her record did not appreciably increase workload.
103	patient-held records actually improved efficiency because they were still more likely to be available at the time of the appointment than hospital-held records
104	The most consistent finding across studies is that patient-accessible medical records enhance doctor patient communication.
105	Because even general medical records may contain potentially worrisome psychological content, these findings support the practice of allowing doctors to exclude certain content from routine patient review
106	It is largely because of the seamless integration between the PHR and the EHR systems that 90 percent of physicians were satisfied with the PHR,
107	Payment policies now discourage the use of online methods of delivering health care: Usually only face-to-face encounters are reimbursed.

108	New policies that compensate physicians for delivering professional services that improve outcomes, regardless of the communication media used, should be developed,
109	New policies that compensate physicians…..Pay-for-performance programs.
110	Integrated PHRs permit both synchronous and asynchronous communication and provide tools for interactive decision-making
111	Auto-population of reusable content will increase the value of PHRs to consumers and providers by eliminating redundant data entry and ensuring more accurate, comprehensive, and timely content
112	interactions between patients and medical professionals will likely improve because practitioners will need to spend less time gathering patient history and be able to spend more time with patients probing deeper into concerns, questions, and clarification about their conditions
113	Asynchronous Internet-based communication tools available in many integrated PHRs will improve patient-provider communication by avoiding "telephone tag"
114	Asynchronous….enabling communication at the convenience of patients and providers;
115	Asynchronous…..automatically including patient-provider email in the record
116	The likely payoff from online communication between providers and patients with chronic conditions will arise in improved treatment monitoring,
117	The likely payoff…….more efficient use of time
118	The likely…..potentially fewer office visits through substitution of online consultation for in person visits,
119	The likely…..improved continuity of care through common access to test results. common access to test results.
120	Ultimately, integrated PHRs should enable comprehensive care that is 'virtually' accessible, continually available, and patient-centered
121	Provider resistance to PHRs may stem from concerns about new processes and increased responsibilities associated with interacting with patients
122	Provider resistance to……..using new health information technologies.
123	for doctors, at a time of disquiet, fatigue and bombardment by paper and electronic 'noise,' even if e-mail improves the quality of communications with patients it threatens to break the camel's back"
124	Given their many other responsibilities, practitioners may be unprepared to assume the role of "information broker"–helping patients look at health-related data from different sources and make informed decisions.
125	Typically, patients are judicious in their communications and many, if not most clinician concerns are mitigated if they take the first step and start using such systems.
126	there is a reported decrease in 'phone-tag' and the capacity to carry out 'elective batched serial communications' by clinicians at the time of their choosing. For example, some clinicians report satisfaction from being able to leave the office, have dinner with their families, and then catch up on a few remaining patient e-mails from their home later in the evening since they can access the records via secure web portals.

127	The lack of compensation or other incentives for responding to patient email...are key components of the problem. Working with data from new sources…. are key components of the problem.
128	facilitating informed/shared decision-making are key components of the problem.
129	using standard evaluation and management (E&M) coding criteria, many electronic message threads can fulfill standard office visit reimbursement criteria
130	Although most patients are not litigious, the widespread use of PHRs and other consumer-centric tools raises new potential areas of liability and risk for health care providers, such as the use of incomplete or inaccurate consumer-reported information, online clinician-patient communication, and privacy and security breaches
131	One of the key barriers to the adoption of EMR systems has been the concerns of healthcare providers that the system will not provide sufficient Return On Investment (ROI).
132	Investment in the development of PHRs is long term and return on investment is not immediately realized. This is because the 'return' is banking on behavior change, i.e., providers' practice pattern and consumers' developing healthier living habits. Behavior change does not necessarily happen on an annual basis but with the right enforcer it has a higher probability of success.
133	there might be "clinically irrelevant" (Tang et al., 2006) personal health data that does not help healthcare providers to determine treatment but helps consumers to modify their behaviors. These personal health data may not need to be made viewable to providers as they clog the traffic to the clinically relevant and critical information for the purpose of delivering care.
134	Access by caregivers and healthcare professionals must be established on a need-to-know basis. In the event that the individual is unable to make a determination on access control as in a medical emergency, healthcare professionals and caregivers should have the rights to "break the glass" in order to save one's life
135	Although survey data reveals that there is a lack of awareness among the public, consumers are receptive to this concept, especially when a physician recommends it.
136	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..Physician promotion is key to achieving high consumer adoption in most places.
137	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..Physician acceptance requires large up-front efforts to gain buy-in.
138	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..If PHR is viewed as beneficial only to patients, it's hard to get physician support.
139	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..PHRs are unlikely to gain widespread clinician acceptance unless they are integrated into the clinical workflow, such as through integration with the office EHR
140	The Connecting for Health Work Group summarised key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..Patient-provider messaging wins over an enthusiastic subset of both patients and doctors, and does not overwhelm the inbox of doctors.

141	The Connecting for Health Work Group…….Patients feel more empowered when they have access to their health information, and many early physician adopters find that helpful.
142	A quarter of responding physicians were not familiar with PHRs.
143	The majority (59.5 percent) did not know if any of their patients used PHRs,
144	Very few physicians indicated that they use information the patients provide through a PHR during patient care (5.1 percent).
145	Almost all respondents (91 percent) reported observing patients bringing in a written list of the medications they are taking
146	81 percent reported observing patients keeping a written list of their conditions/disease states.
147	Almost half (46.6 percent) of respondents reported seeing patients maintain a PHR in paper form.
148	It is possible that physicians are unfamiliar with the term (PHR) but familiar with the concept.
149	There is a clear gap between reported use by patients and perceptions of patient PHR use by physicians.
150	patients may find that their physicians are not responsive to the sharing of information through technology. As a result, they provide the physician with paper records. This is one possible explanation for the disparate findings between paper records and electronic PHR recognition by physicians relative to their patients
151	Physicians that encourage more patient-provider interaction through PHRs and other newer technologies may find themselves in higher demand.
152	it seems reasonable to posit that they will expect physicians to involve them more in care decisions and to be able to exchange health data.
153	Yet, more male physicians than female physicians reported using the patient's PHR information
154	Yet, more male physicians than female having a member of their staff work with the patients and their PHRs
155	Yet, more male physicians than female physicians being capable of electronically integrating PHR information into their own HER
156	Physicians identifying their specialty as general pediatrics reported using PHR information less than their counterparts in general/family practice, internal medicine, or obstetrics/gynecology.
157	Medical school physicians report more of their patients utilizing electronic PHRs
158	physicians who are EHR users reported greater awareness of PHR use by their patients
159	we might surmise that physicians favoring HIT use may be encouraging patients to maintain PHRs
160	As the technology for PHR integration continues to expand, it is possible that physicians will be encouraged to further develop their use of PHR information.
161	physicians and staff thought a patient portal could reduce the hassle of telephone overuse and believed there were opportunities for time savings and load balancing of work through the introduction of asynchronous messaging
162	they also feared that their time would be under greater demand if phone access continues for patients and the new Web access added additional message volume.

163	Physicians also worried that workflow would be disrupted by another messaging tool unless it was carefully coordinated.
164	Some felt that unless their time was reimbursed for Web visits and online communication, they would not favor online communication with patients.
165	Physicians found that 90% of patient messages never reached them since they were administrative in nature.
166	identifying and addressing physician concerns will continue to be a challenge.
167	In general physicians are reluctant to adopt new information systems, especially if the systems do not directly benefit them.
168	Despite the numerous potential benefits of email, physicians have generally been hesitant to adopt the practice of regularly using it to communicate with patients
169	physicians are using their own email systems to message patients rather than the general electronic messaging function of an application like PG.
170	Before beginning to use PG, physicians feared that they would be overwhelmed with messages
171	As patients become more familiar with applications like PG and use these applications for electronic requests relating to refills, referrals and the scheduling of appointments, physicians are likely to receive fewer emails concerning these requests, which can be more appropriately handled by staff members through an application like PG.
172	Despite their hesitancy to use the general messaging function of PG with patients, physicians largely viewed the overall effect of PG's other functions (refill, referral and appointment requests) as positive.
173	A majority of survey respondents cited improved patient–practice communication as a benefit of the application
174	physician fears that PG's implementation would increase workload seem to have been unfounded
175	Although surveyed physicians identified many benefits of PG, most remain concerned about the current lack of reimbursement for electronic communication with patients.
176	This lack of compensation may contribute to many physicians' hesitancy to use PG's general messaging functionality.
177	approximately three-quarters would be willing to increase email use with patients if they were financially compensated for time spent doing so.
178	would recommend PG to colleagues.
179	In a previous study, we identified that barriers to increased physician–patient email related to workload, security and workflow.
180	use of physician–patient electronic messaging, citing improvements in communication, better continuity of care, more timely diagnoses and reduced frequencies of adverse drug events as probable benefits of efficient and secure electronic communication between physicians and their patients
181	physicians have been resistant to the idea of using PG to receive general messages concerning clinical questions from patients
182	Most felt the medication list, normal studies, prescription refills, appointments, and referrals should be provided to the patients
183	they felt progress notes, abnormal labs, and care over the internet should not be provided.

184	They were more positive than negative about the effects of the system,
185	subset of 'control' physicians who did not see e-care as improving quality and did not want two-way messaging.
186	physicians not exposed to patient access to their own EMR saw many aspects of the policy as positive.
187	Physicians who do not see patients as their partners are more likely to be negative;
188	Patients were more likely than the physicians to anticipate that access to the medical record would be patient empowering.
189	but one-third of the physicians believed that the requests were prompted by "litigious motives" or "from the need to obtain secondary gain.

Appendix D: Modified definition of UTAUT core constructs

A. Performance Expectancy:

Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains/losses (i.e. financial, increase or decrease in patients, improvement of efficiency, in <u>job performance</u>. It will make work easier/difficult.

B. Effort Expectancy

Effort expectancy is defined as the degree of ease associated with the use of the <u>system</u>. The individual thinks that the system is easy/ difficult to use/learn.

C. Social Influence:

Social influence is defined as the degree to which an <u>Individual perceives</u> that ~~important others~~/ other people (i.e. colleagues, friends, boss, superiors,…) believe he or she should/should not use the new system.

D. Facilitating condition:

Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. It is made attractive to you as a user by providing any benefits or any penalty. An <u>external</u> benefit or detriment facilitates the adoption.

E. Other:
If it meets none of the above criteria then the item will go in this category.

Appendix E: Phase two-Categorization of items/units of analysis into UTAUT Core constructs

	Items	Coder A	Coder B	Agreement	Rational behind agreement/disagreement
1	PHRs have the potential to dramatically improve the patient-provider relationship	A	A		
2	PHRs have the potential...enhance...shared decision making	A	A		
3	Understanding and addressing attitudinal and physical adoption barriers among patients and healthcare providers represents an important key to achieving widespread implementation and use of PHRs.	A	E	E	Barriers to physical adoption does not relate to performance.
4	Nevertheless, some studies suggest that physicians may be more reticent to adopt PHRs than other health professionals, due to concerns about whether adoption of PHRs will create additional work that is not reimbursed.	D	A	D	Because reimbursement is the main idea in this item.
5	Less information is available about provider attitudes toward PHRs	A	E	E	Attitudes is not covered in any of the given constructs
6	Research on adoption and attitudes should focus on factors associated with attitudes, adoption, and use,	A	E	E	Attitudes is not covered in any of the given constructs
7	studies suggest that physicians may be more reticent to adopt PHRs than other health professionals	E	C	E	No social influence is found in the sentence
8	Studies also report low use among providers	E	E		
9	Each constituency—patients, providers (physicians and non-physicians), payers, pharmacies, labs, etc.—must have sufficient incentives in order for them to	D	D		

	be willing to participate in a PHR,				
10	For provider groups which develop PHRs, there must be sufficient revenue or other return on investment to justify implementing and providing support for the PHR.	D	D		
11	non-visit care is not generally reimbursed, so strong incentives exist for providers to delay PHR implementation, even if they already have an EHR with PHR functionality	D	D		
12	secure e-mail between patients and providers improved the ease and quality of communication.	A	A		
13	Having more data helps clinicians to make better decisions.	A	A		
14	The PHR may also become a conduit for improved sharing of medical records	A	A		
15	asynchronous, PHR-mediated electronic communication between patients and members of their healthcare teams can free clinicians from the limitations of telephone and face-to-face communication, or improve the efficiency of such personal contacts.	A	A		
16	all the advantages of PHRs for providers depend on the PHR being integrated with the provider's EHR.	A	E	E	Integration is not a performance issue
17	Hopefully, providers will recognize that paying for PHRs may give them a competitive advantage in the marketplace.	A	D	D	Competitive advantage will be the facilitating condition
18	Small incentives to healthcare providers may be enough to encourage them to adopt EHRs that link to PHRs.	D	D		
19	Many of the putative financial benefits of PHRs only occur when PHRs are tightly integrated with EHRs, so that seed funding of PHRs in practices that operate an EHR	D	D		

	might advance PHR adoption to the "tipping point."				
20	physicians demands for remuneration may be higher	D	D		
21	Although data provided by patients can inform providers' decision-making, not all patient-supplied data will do so, and the volume of "clinically irrelevant" information in their patients' PHRs might become overwhelming for a healthcare provider to review.	A	A		
22	Other barriers to PHR adoption involve legal concerns on the part of providers….Providers are wary of the legal implications of PHRs, which we don't yet understand. For example, courts might apply negligence standards in cases where practitioners rely on inaccurate patient-entered PHR information to make sub-optimal decisions about care.	B	D	D	There is not any clear indication of effort related issue in this item
23	While consumers appropriately desire protection of their private health information, aggressive protection measures might hamper PHR access by patients and clinicians and impede optimal care.	A	D	B	Aggressive protection measure could impede use of system
24	It is possible that PHRs will threaten the control, autonomy, and authority of some health care providers, based on traditional provider-patient roles.	A	A		
25	Providers and patients will need to develop different mindsets and levels of trust.	E	A	E	It does not have clear information on performance.
26	Providers must learn to encourage patients to enter the information accurately, and to trust that information appropriately.	E	A		Unable to reach consensus.
27	For PHR adoption, change management issues involve providers, consumers, and	C	E	E	involvement of providers, consumers and regulators does not imply social

	regulators				influence
28	Participants elucidated the potential of PHR systems to transform patient-provider relationships,	A	A		
29	The more comprehensive the data contained in a PHR, the more useful it will be to...care providers	A	A		
30	The developers and users of EHRs and PHRs must understand individuals' and clinicians' mental models of healthcare processes, and the related workflows.	B	E	E	Understanding the processes and workflow do not imply the ease or difficulty of use.
31	organizational and behavioral issues can delay PHR adoption. Barriers exist both at the environmental level and at the level of individual health care professionals and consumers.	B	D	D	Environmental barriers could not be same as system related barriers.
32	The broad purpose for personal health records is to facilitate communication between clinicians and patients.	A	A		
33	We propose a governance model with five functions and roles that recognize clinicians and patients as key stakeholders and include them as members. • Information/Assessment Capacity • Policy Formulation & Planning • Social Participation & Responsiveness Accountability • Clinical Leadership	E	E		
34	sharing problem list...supported by clinicians debated sharing problem list entries which are considered highly private with patients online	A	A		
35	We all share full text descriptions of problems rather than simple ICD9 codes.	E	E		
36	included debate about several issues… We debated the sharing of psychiatric diagnoses such as Schizophrenia or Munchausen's. Would sharing such detail impede patient therapy or erode	A	A		

	trust in clinicians?				
37	The decision-making process to share all problem list entries included debate about several issues…Clinicians also debated sharing problem list entries which are considered highly private with patients online i.e., sexually transmitted diseases, HIV, and substance abuse treatment.	A	A		
38	All three of our organizations made the decision to share the entire medication list. As with the problem list, no complaints have been received via the formal feedback mechanisms used for communicating issues to our application support staff.	A	A		
39	Clinicians debated showing medications for HIV, substance abuse treatment and psychiatric treatment.	A	A		
40	Enabling patients to reconcile their own medications via a PHR is a powerful way for providers to meet Joint Commission outpatient medication reconciliation requirements, which necessitate asking the patient about active medications to ensure the medication list is accurate at each site of care.	A	A		
41	We all agreed to share full allergy data with patients.	A	A		
42	We all agreed to share all laboratory and diagnostic test results with patients except those restricted by state law.	A	A		

43	If possible, it is useful to have a provider review test results prior to its becoming available for the patient—if they can be reviewed in a timely manner. Giving the provider a chance to annotate, explain, or deliver the results verbally (especially when the results are abnormal) can enhance the communication of the results and the patient's understanding of them.	A	A		
44	Early in the implementation of PatientSite, some clinicians were reluctant to share results with patients, fearing that sharing information with patients could result in a stream of phone calls and emails about abnormal but clinically insignificant results.	A	A		
45	Should All Laboratory and Diagnostic Test Results Be Shared with the Patient?	A	A		
46	Laboratory and diagnostic tests results may present bad news to a patient—a first time diagnosis, a recurrence of a disease or a worsening existing condition.	E	D	E	Does not correlate with facilitating condition
47	Should the PHR Include Secure Clinician/Patient Messaging?...... The challenge of secure patient messaging revolves around legal liability and reimbursement for medical advice rendered online.	A	D	D	Legal liability and reimbursement are the external barriers. The initial part of the item made it confusing and it should not be there.
48	physicians were concerned that they would be flooded with messages……..Our data do not support this.	A	A		
49	Should Clinical Notes Be Shared with the Patient?.....Ultimately the patient has the right to examine the entire medical chart, including progress notes. However, the level of explanation required to help the patient understand their contents impedes sharing clinician notes with patients. Currently,	A	A		

	most PHRs do not include progress notes for this reason.				
50	To add to the complexity some clinicians in our institutions have said they would share some notes with some patients, but not all notes with all patients.	A	A		
51	Other reasons for reluctance to share notes include the fact that clinicians may use notes to record personal thoughts, not intended to share with patients. Some clinicians may be willing to write notes with patient sharing in mind, but clearly note sharing must be configurable by each note author.	A	A		
52	BIDMC sought approval of leaders in the psychiatry department, who agreed that sharing the full detail of problem lists/ diagnoses but not full text psychiatric notes with the patient would be an appropriate approach that would likely encourage helpful discussion between providers and patients.	A	A		
53	One of the major impediments to physician adoption...is a lack of reimbursement	D	D		
54	payers are interested in taking advantage of electronic clinical messaging dilemma is how to determine which communication involves sufficient data-gathering, to qualify for reimbursement	C	E	D	Reimbursement is the facilitating condition
55	We proposed a set of criteria that is nearly identical to the office-based E&M coding criteria and have tested the feasibility of applying such	E	E		

	criteria to a random sample of actual online patient messages occurring through PAMFOnline.				
56	criteria were easy to apply consistently	B	E	E	The item (sentence)is not clear
57	a reimbursement strategy must be designed to compensate providers for their investment in technology to compensate providers and the delivery of professional services online	D	D		
58	Sharing data and creating a robust communication strategy to link all members of the health care team, including the patient, may be the best way to improve care, improve coordination, and reduce costs.	A	A		
59	The 22% of electronic messages directed to physicians that met the eVisit criteria seemed appropriate since messages that do not specifically require physician professional services can be self directed by patients to other administrative communication channels available through PAMFOnline.	E	A	A	The item was not clear but the issue is related to the work flow.
60	modest increase in cost...offset by a reduction in office visit claims	D	D		
61	A fair method of compensating physician professional time for rendering care online is needed.	D	D		
62	Physicians expectations...Before the trial period, physicians were mixed in their opinions about providing patients online access to their records.	A	A		
63	Physicians were more likely to anticipate concerns (particularly that access to records would increase patient worry and that patients would find laboratory and x-ray reports confusing).	A	A		

64	Physicians expectations...All predicted that the intervention would not change hard outcomes (such as mortality, cardiac events, and hospitalization), their decision making, or their relationships with their patients.	A	A		
65	although initially fewer than half of the physicians anticipated that access to medical records would be patient empowering, at the conclusion of the study all physicians did.	C	E	E	Does not see the social influence in the idea.
66	Physicians expectations...Some physicians were concerned that by bypassing them as information gatekeepers, online access to records would distort the clinical encounter. It might create the expectation that patients should set the clinical agenda, forcing the doctor to address patients' issues with the record, distracting the doctor from more important issues.	A	A		
67	Physicians expectations...Others felt that increasing the availability of information would increase trust in the doctor–	A	A		
68	Physicians expectations...Physicians wondered how effective medical records would be at educating patients. Some noted that because the record is not intended for patient education, it is more likely to confuse	A	A		
69	Physicians expectations...Others felt that it would educate patients both about their condition and the process and complexity of the care they provide.	A	A		
70	Physicians expectations...Whether patient access to records would increase or decrease…..errors was another concern.	A	A		

71	Physicians expectations...Others hypothesized that patients would identify and correct inaccuracies in their records	A	A		
72	Physicians expectations...Others….noted that physicians might be more compulsive in their record keeping, knowing that patients might be reviewing their records later.	A	A		
73	Physicians expectations...Physicians were also concerned about how patients would respond to reading sensitive information about substance use,	A	A		
74	Physicians expectations...Physicians were also concerned about how patients would respond…...psychiatric illness,	A	E	A	Response to psychiatric illness could impact communication or relationship between patient and provider.
75	Physicians expectations...They worried that patients would be offended, thus, creating tension in the physician–patient relationship.	A	A		
76	Physicians expectations...Others felt that candor was always best and that the record was ''not a place for secrets	A	A		
77	Physician Experience….The principal change in the providers' attitudes after the trial period was that their concerns about potential deleterious effects from giving patients access to their records were largely gone.	A	A		
78	In the interviews after the trial period, none of the participating physicians voiced any of the concerns that they mentioned in the initial interviews.	A	C	E	Idea is not clear
79	The consensus opinion was that the SPPAROproject was invisible from their perspective.	A	E	E	Invisible is not defined or clear
80	In practice, they were unaware of the intervention and did not feel it affected their workflow	A	A		

81	In practice, they were unaware of the intervention and did not feel it affected …...or their relationship with their patients	A	A		
82	With one exception, none of the physicians felt that any of these interactions were problematic (confusing, worrisome, overly time consuming, or embarrassing) in any way; instead, they recalled them in a positive light.	A	A		
83	Four of the seven physicians did not notice any lasting change in their style of documentation.	A	A		
84	Three physicians felt that they had changed their documentation style somewhat to make it more understandable to the patients.	A	A		
85	None of them viewed that as a problem, and none felt that it cost them a significant amount of time:	A	A		
86	Of the three who changed their documentation, each felt that this was a positive outcome. One felt that it would improve the level of honesty in the medical record:	A	A		
87	All the providers considered patients' interest in their medical records to be understandable and reasonable.	C	C		
88	Two offered unqualified support, citing their belief that patients were more involved in their care and benefited from more information.	C	C		
89	None felt that patients should be denied access or that facilitating patient access to records was intrinsically a bad idea.	C/E	A	E	Does not meet any construct definitions
90	They wondered if their experience would be replicated in a practice with fewer personnel resources, a higher patient volume, and a less-sophisticated patient population.	A	A		

91	Each questioned whether the merits of the intervention would warrant the resources spent on it	A	D	E	Intervention term is not clearly defined
92	One was concerned that it might exacerbate disparities in care, noting that such systems are more likely to be used by socioeconomically advantaged patients and may lead to those patients claiming a disproportionate share of the doctors' time	A	A		
93	physicians expressed concerns initially they viewed patient-accessible records much more favorably after none of these concerns materialized	A	E	E	Does not fit into any category
94	all agreed that they were in favor of giving patients direct access to their test results and clinical notes…	E	A		Unable to reach consensus
95	Physicians and professional raters have analyzed medical and psychiatric case notes to see whether they are appropriate for patients to read.	E	A	E	Does not match to any of the constructs
96	most physicians believed that patients requested to read their records for "further treatment, education, or additional information,"	E	A	A	usefulness of PHR is mentioned in this item
97	Although no quantifiable benefits in patient-provider communication were shown in a nonrandomized controlled trial of medical inpatients, there were "numerous individual instances" in which access to the medical record prompted doctor and patient to have "useful discussions	A	A		
98	staff had the impression that patient access to the records changed documentation patterns	E	A	A	change in documentation may impact the performance.
99	80% reported that access to records gave them more confidence in doctors and made them feel better understood	A	A		

100	The psychiatric case notes appeared to be even more problematic—among records that were legible, roughly 80% contained entries that were potentially puzzling, offensive, alarming, or upsetting, as determined both by practitioners and patients	A	A		
101	When medical staff members are interviewed about the impact of providing medical records to patients, a frequent concern is the time that they will spend explaining it to patients.	A	A		
102	In most studies, however, merely giving the patient access to his or her record did not appreciably increase workload.	A	A		
103	patient-held records actually improved efficiency because they were still more likely to be available at the time of the appointment than hospital-held records	A	A		
104	The most consistent finding across studies is that patient-accessible medical records enhance doctor patient communication.	A	A		
105	Because even general medical records may contain potentially worrisome psychological content, these findings support the practice of allowing doctors to exclude certain content from routine patient review	E	A		Unable to reach consensus
106	It is largely because of the seamless integration between the PHR and the EHR systems that 90 percent of physicians were satisfied with the PHR,	B	D	D	EHR provides the technical infrastructure.
107	Payment policies now discourage the use of online methods of delivering health care: Usually only face-to-face encounters are reimbursed.	D	D		
108	New policies that compensate physicians for delivering professional services that improve outcomes, regardless of the communication media used,	D	D		

	should be developed,				
109	New policies that compensate physicians…..Pay-for-performance programs.	D	D		
110	Integrated PHRs permit both synchronous and asynchronous communication and provide tools for interactive decision-making	A	A		
111	Auto-population of reusable content will increase the value of PHRs to consumers and providers by eliminating redundant data entry and ensuring more accurate, comprehensive, and timely content	A	E	A	Has impact on performance
112	interactions between patients and medical professionals will likely improve because practitioners will need to spend less time gathering patient history and be able to spend more time with patients probing deeper into concerns, questions, and clarification about their conditions	A	A		
113	Asynchronous Internet-based communication tools available in many integrated PHRs will improve patient-provider communication by avoiding "telephone tag"	A	A		
114	Asynchronous….enabling communication at the convenience of patients and providers;	A	A		
115	Asynchronous…..automatically including patient-provider email in the record	A	A		
116	The likely payoff from online communication between providers and patients with chronic conditions will arise in improved treatment monitoring,	A	A		
117	The likely payoff…….more efficient use of time	A	A		

118	The likely…..potentially fewer office visits through substitution of online consultation for in person visits,	A	A		
119	The likely…..improved continuity of care through common access to test results. common access to test results.	A	A		
120	Ultimately, integrated PHRs should enable comprehensive care that is 'virtually' accessible, continually available, and patient-centered	A	A		
121	Provider resistance to PHRs may stem from concerns about new processes and increased responsibilities associated with interacting with patients	A	A		
122	Provider resistance to……..using new health information technologies.	A	B	E	Reason for resistance is not mentioned
123	for doctors, at a time of disquiet, fatigue and bombardment by paper and electronic 'noise,' even if e-mail improves the quality of communications with patients it threatens to break the camel's back"	A	A		
124	Given their many other responsibilities, practitioners may be unprepared to assume the role of "information broker"–helping patients look at health-related data from different sources and make informed decisions.	A	A		
125	Typically, patients are judicious in their communications and many, if not most clinician concerns are mitigated if they take the first step and start using such systems.	E	E		
126	there is a reported decrease in 'phone-tag' and the capacity to carry out 'elective batched serial communications' by clinicians at the time of their choosing. For example, some clinicians report satisfaction from being able to leave the office, have dinner with their families, and then catch up on a few remaining	A	A		

	patient e-mails from their home later in the evening since they can access the records via secure web portals.				
127	The lack of compensation or other incentives for responding to patient email...are key components of the problem. working with data from new sources…. are key components of the problem.	D	D		
128	facilitating informed/shared decision-making are key components of the problem.	E	A	E	The "problem" is not clear in this item
129	using standard evaluation and management (E&M) coding criteria, many electronic message threads can fulfill standard office visit reimbursement criteria	A	D		
130	Although most patients are not litigious, the widespread use of PHRs and other consumer-centric tools raises new potential areas of liability and risk for health care providers, such as the use of incomplete or inaccurate consumer-reported information, online clinician-patient communication, and privacy and security breaches	C	A,D	D	potential liability risk is facilitating condition
131	One of the key barriers to the adoption of EMR systems has been the concerns of healthcare providers that the system will not provide sufficient Return On Investment (ROI).	D	D		
132	Investment in the development of PHRs is long term and return on investment is not immediately realized. This is because the 'return' is banking on behavior change, i.e., providers' practice pattern and consumers' developing healthier living habits. Behavior change	D	D		

	does not necessarily happen on an annual basis but with the right enforcer it has a higher probability of success.				
133	there might be "clinically irrelevant" (Tang et al., 2006) personal health data that does not help healthcare providers to determine treatment but helps consumers to modify their behaviors. These personal health data may not need to be made viewable to providers as they clog the traffic to the clinically relevant and critical information for the purpose of delivering care.	A	A		
134	Access by caregivers and healthcare professionals must be established on a need-to-know basis. In the event that the individual is unable to make a determination on access control as in a medical emergency, healthcare professionals and caregivers should have the rights to "break the glass" in order to save one's life	E	A	A	Having the access to the information in case of emergency may improve or may have impact on physician performance
135	Although survey data reveals that there is a lack of awareness among the public, consumers are receptive to this concept, especially when a physician recommends it.	C	C		
136	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..Physician promotion is key to achieving high consumer adoption in most places.	E	C	C	Physician promotion is the influential point for patient to use PHR.

137	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..Physician acceptance requires large up-front efforts to gain buy-in.	A	D	D	Outside influence
138	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..If PHR is viewed as beneficial only to patients, it's hard to get physician support.	C	C		
139	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..PHRs are unlikely to gain widespread clinician acceptance unless they are integrated into the clinical workflow, such as through integration with the office EHR	A	B	A	Integration with workflow makes work easier
140	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..Patient-provider messaging wins over an enthusiastic subset of both patients and doctors, and does not overwhelm the inbox of doctors.	A	A		
141	The Connecting for Health Work Group…….Patients feel more empowered when they have access to their health information, and many early physician adopters find that helpful.	A	A		
142	A quarter of responding physicians were not familiar with PHRs.	E	E		
143	The majority (59.5 percent) did not know if any of their patients used PHRs,	E	E		

144	Very few physicians indicated that they use information the patients provide through a PHR during patient care (5.1 percent).	C	A	A	Usefulness is part of performance
145	Almost all respondents (91 percent) reported observing patients bringing in a written list of the medications they are taking	C/E	A	E	Fall into none of the category
146	81 percent reported observing patients keeping a written list of their conditions/disease states.	C/E	A	E	Fall into none of the category
147	Almost half (46.6 percent) of respondents reported seeing patients maintain a PHR in paper form.	E	A	E	Fall into none of the category
148	It is possible that physicians are unfamiliar with the term (PHR) but familiar with the concept.	E	E		
149	There is a clear gap between reported use by patients and perceptions of patient PHR use by physicians.	E	E		
150	patients may find that their physicians are not responsive to the sharing of information through technology. As a result, they provide the physician with paper records. This is one possible explanation for the disparate findings between paper records and electronic PHR recognition by physicians relative to their patients	C	A	E	Not clear if it relates to any of the given constructs
151	Physicians that encourage more patient-provider interaction through PHRs and other newer technologies may find themselves in higher demand.	A	A		
152	it seems reasonable to posit that they will expect physicians to involve them more in care decisions and to be able to exchange health data.	A	A		
153	Yet, more male physicians than female physicians reported using the patient's PHR information	E	E		
154	Yet, more male physicians than female having a member of their staff work with the patients and their PHRs	E	E		

155	Yet, more male physicians than female physicians being capable of electronically integrating PHR information into their own HER	E	E		
156	Physicians identifying their specialty as general pediatrics reported using PHR information less than their counterparts in general/family practice, internal medicine, or obstetrics/gynecology.	E	C	E	There is no reasoning in the idea that why one group see it useful than the other
157	Medical school physicians report more of their patients utilizing electronic PHRs	C	C		
158	physicians who are EHR users reported greater awareness of PHR use by their patients	A	E	D	EHR is the technical infrastructure
159	we might surmise that physicians favoring HIT use may be encouraging patients to maintain PHRs	A	E	D	using HIT provides technical infrastructure
160	As the technology for PHR integration continues to expand, it is possible that physicians will be encouraged to further develop their use of PHR information.	A	A		
161	physicians and staff thought a patient portal could reduce the hassle of telephone overuse and believed there were opportunities for time savings and load balancing of work through the introduction of asynchronous messaging	A	A		
162	they also feared that their time would be under greater demand if phone access continues for patients and the new Web access added additional message volume.	A	A		
163	Physicians also worried that workflow would be disrupted by another messaging tool unless it was carefully coordinated.	A	A		
164	Some felt that unless their time was reimbursed for Web visits and online communication, they would not favor online communication with patients.	D	D		

165	Physicians found that 90% of patient messages never reached them since they were administrative in nature.	A	A		
166	identifying and addressing physician concerns will continue to be a challenge.	E	E		
167	In general physicians are reluctant to adopt new information systems, especially if the systems do not directly benefit them.	A	D	A	The benefits could be external (financial) or improvement in the performance so that is why it will go to both A and D category
168	Despite the numerous potential benefits of email, physicians have generally been hesitant to adopt the practice of regularly using it to communicate with patients	A	D	A	communication has impact on performance
169	physicians are using their own email systems to message patients rather than the general electronic messaging function of an application like PG.	E	A	E	No clear reasoning over the preferences
170	Before beginning to use PG, physicians feared that they would be overwhelmed with messages	A	A		
171	As patients become more familiar with applications like PG and use these applications for electronic requests relating to refills, referrals and the scheduling of appointments, physicians are likely to receive fewer emails concerning these requests, which can be more appropriately handled by staff members through an application like PG.	B	A	A	It has impact on the workload
172	Despite their hesitancy to use the general messaging function of PG with patients, physicians largely viewed the overall effect of PG's other functions (refill, referral and appointment requests) as positive.	A	A		
173	A majority of survey respondents cited improved patient–practice communication as a benefit of the application	A	A		

174	physician fears that PG's implementation would increase workload seem to have been unfounded	D	A	A	Workload is related to the performance
175	Although surveyed physicians identified many benefits of PG, most remain concerned about the current lack of reimbursement for electronic communication with patients.	D	D		
176	This lack of compensation may contribute to many physicians' hesitancy to use PG's general messaging functionality.	D	D		
177	approximately three-quarters would be willing to increase email use with patients if they were financially compensated for time spent doing so.	D	D		
178	would recommend PG to colleagues.	E	C	E	The individual who is recommending is not the one who perceives the influence.
179	In a previous study, we identified that barriers to increased physician–patient email related to workload, security and workflow.	A	A		
180	use of physician–patient electronic messaging, citing improvements in communication, better continuity of care, more timely diagnoses and reduced frequencies of adverse drug events as probable benefits of efficient and secure electronic communication between physicians and their patients	A	A		
181	physicians have been resistant to the idea of using PG to receive general messages concerning clinical questions from patients	A	A		
182	Most felt the medication list, normal studies, prescription refills, appointments, and referrals should be provided to the patients	E	A	E	It is not clear indication of any impact on performance
183	they felt progress notes, abnormal labs, and care over the internet should not be provided.	E	A	E	It is not clear indication of any impact on performance

184	They were more positive than negative about the effects of the system,	A	E	E	It is vague
185	subset of 'control' physicians who did not see e-care as improving quality and did not want two-way messaging.	A	A		
186	physicians not exposed to patient access to their own EMR saw many aspects of the policy as positive.	C	A	E	Not clear
187	Physicians who do not see patients as their partners are more likely to be negative;	C	A	C	Patient's partnership is the social influence
188	Patients were more likely than the physicians to anticipate that access to the medical record would be patient empowering.	C	C		
189	but one-third of the physicians believed that the requests were prompted by "litigious motives" or "from the need to obtain secondary gain.	D	D		

Appendix F: Final phase-Sub categorization of the items into similar groups

Item Number	Items	Category	Analyst A	Analyst B
1	PHRs have the potential to dramatically improve the patient-provider relationship	A	A1	SA1
24	It is possible that PHRs will threaten the control, autonomy, and authority of some health care providers, based on traditional provider-patient roles.	A	A1	SA1
28	Participants elucidated the potential of PHR systems to transform patient-provider relationships,	A	A1	SA1
67	Physicians expectations...Others felt that increasing the availability of information would increase trust in the doctor–	A	A1	SA1
69	Physicians expectations...Others felt that it would educate patients both about their condition and the process and complexity of the care they provide.	A	A1	SA1
74	Physicians expectations...Physicians were also concerned about how patients would respond…...psychiatric illness,	A	A1	SA1
75	Physicians expectations...They worried that patients would be offended, thus, creating tension in the physician–patient relationship.	A	A1	SA1
81	In practice, they were unaware of the intervention and did not feel it affected …...or their relationship with their patients	A		SA1
2	PHRs have the potential...enhance...shared decision making	A	A2	SA2
13	Having more data helps clinicians to make better decisions.	A	A2	SA2

21	Although data provided by patients can inform providers' decision-making, not all patient-supplied data will do so, and the volume of "clinically irrelevant" information in their patients' PHRs might become overwhelming for a healthcare provider to review.	A	A2	SA2
37	The decision-making process to share all problem list entries included debate about several issues…Clinicians also debated sharing problem list entries which are considered highly private with patients online i.e., sexually transmitted diseases, HIV, and substance abuse treatment.	A	A2	SA2
64	Physicians expectations...All predicted that the intervention would not change hard outcomes (such as mortality, cardiac events, and hospitalization), their decision making, or their relationships with their patients.	A	A2	SA2
124	Given their many other responsibilities, practitioners may be unprepared to assume the role of "information broker"– helping patients look at health-related data from different sources and make informed decisions.	A	A2	SA2
152	it seems reasonable to posit that they will expect physicians to involve them more in care decisions and to be able to exchange health data.	A	A2	SA2
12	secure e-mail between patients and providers improved the ease and quality of communication.	A	A3	SA5
14	The PHR may also become a conduit for improved sharing of medical records	A	A3	SA12
15	asynchronous, PHR-mediated electronic communication between patients and members of their healthcare teams can free clinicians from the limitations of telephone and face-to-face communication, or improve the efficiency of such personal contacts.	A	A3	SA5
32	The broad purpose for personal health records is to facilitate communication between clinicians and patients.	A	A3	SA5

43	If possible, it is useful to have a provider review test results prior to its becoming available for the patient—if they can be reviewed in a timely manner. Giving the provider a chance to annotate, explain, or deliver the results verbally (especially when the results are abnormal) can enhance the communication of the results and the patient's understanding of them.	A	A3	SA5
48	physicians were concerned that they would be flooded with messages……..Our data do not support this.	A	A3	SA5
52	BIDMC sought approval of leaders in the psychiatry department, who agreed that sharing the full detail of problem lists/ diagnoses but not full text psychiatric notes with the patient would be an appropriate approach that would likely encourage helpful discussion between providers and patients.	A	A3	SA5
58	Sharing data and creating a robust communication strategy to link all members of the health care team, including the patient, may be the best way to improve care, improve coordination, and reduce costs.	A	A3	SA5
59	The 22% of electronic messages directed to physicians that met the eVisit criteria seemed appropriate since messages that do not specifically require physician professional services can be self directed by patients to other administrative communication channels available through PAMFOnline.	A	A3	SA5
97	Although no quantifiable benefits in patient-provider communication were shown in a nonrandomized controlled trial of medical inpatients, there were "numerous individual instances" in which access to the medical record prompted doctor and patient to have "useful discussions	A	A3	SA5
104	The most consistent finding across studies is that patient-accessible medical records enhance doctor patient communication.	A	A3	SA5
113	Asynchronous Internet-based communication tools available in many integrated PHRs will improve patient-provider communication by avoiding	A	A3	SA5

	"telephone tag"			
114	Asynchronous….enabling communication at the convenience of patients and providers;	A	A3	SA5
115	Asynchronous…..automatically including patient-provider email in the record	A	A3	SA5
116	The likely payoff from online communication between providers and patients with chronic conditions will arise in improved treatment monitoring,	A	A3	SA5
118	The likely…..potentially fewer office visits through substitution of online consultation for in person visits,	A	A3	SA5
123	for doctors, at a time of disquiet, fatigue and bombardment by paper and electronic 'noise,' even if e-mail improves the quality of communications with patients it threatens to break the camel's back"	A	A3	SA5
126	there is a reported decrease in 'phone-tag' and the capacity to carry out 'elective batched serial communications' by clinicians at the time of their choosing. For example, some clinicians report satisfaction from being able to leave the office, have dinner with their families, and then catch up on a few remaining patient e-mails from their home later in the evening since they can access the records via secure web portals.	A	A3	SA5
151	Physicians that encourage more patient-provider interaction through PHRs and other newer technologies may find themselves in higher demand.	A	A3	SA5
161	physicians and staff thought a patient portal could reduce the hassle of telephone overuse and believed there were opportunities for time savings and load balancing of work through the introduction of asynchronous messaging	A	A3	SA5
162	they also feared that their time would be under greater demand if phone access continues for patients and the new Web access added additional message volume.	A	A3	SA5
165	Physicians found that 90% of patient messages never reached them since they were administrative in nature.	A	A3	SA5

168	Despite the numerous potential benefits of email, physicians have generally been hesitant to adopt the practice of regularly using it to communicate with patients	A	A3	SA5
170	Before beginning to use PG, physicians feared that they would be overwhelmed with messages	A	A3	SA5
173	A majority of survey respondents cited improved patient–practice communication as a benefit of the application	A	A3	SA5
180	use of physician–patient electronic messaging, citing improvements in communication, better continuity of care, more timely diagnoses and reduced frequencies of adverse drug events as probable benefits of efficient and secure electronic communication between physicians and their patients	A	A3	SA5
181	physicians have been resistant to the idea of using PG to receive general messages concerning clinical questions from patients	A	A3	SA5
29	The more comprehensive the data contained in a PHR, the more useful it will be to...care providers	A	A4	SA11
40	Enabling patients to reconcile their own medications via a PHR is a powerful way for providers to meet Joint Commission outpatient medication reconciliation requirements, which necessitate asking the patient about active medications to ensure the medication list is accurate at each site of care.	A	A4	SA11
68	Physicians expectations...Physicians wondered how effective medical records would be at educating patients. Some noted that because the record is not intended for patient education, it is more likely to confuse	A	A4	SA11
73	Physicians expectations...Physicians were also concerned about how patients would respond to reading sensitive information about substance use,	A	A1	SA1
111	Auto-population of reusable content will increase the value of PHRs to consumers and providers by eliminating redundant data entry and ensuring more accurate, comprehensive, and timely content	A	A4	SA11

120	Ultimately, integrated PHRs should enable comprehensive care that is 'virtually' accessible, continually available, and patient-centered	A	A4	SA11
144	Very few physicians indicated that they use information the patients provide through a PHR during patient care (5.1 percent).	A	A4	SA11
160	As the technology for PHR integration continues to expand, it is possible that physicians will be encouraged to further develop their use of PHR information.	A	A4	SA11
171	As patients become more familiar with applications like PG and use these applications for electronic requests relating to refills, referrals and the scheduling of appointments, physicians are likely to receive fewer emails concerning these requests, which can be more appropriately handled by staff members through an application like PG.	A	A4	SA11
172	Despite their hesitancy to use the general messaging function of PG with patients, physicians largely viewed the overall effect of PG's other functions (refill, referral and appointment requests) as positive.	A	A4	SA11
34	sharing problem list...supported by clinicians debated sharing problem list entries which are considered highly private with patients online	A	A5	SA3
36	included debate about several issues… We debated the sharing of psychiatric diagnoses such as Schizophrenia or Munchausen's. Would sharing such detail impede patient therapy or erode trust in clinicians?	A	A5	SA3
41	We all agreed to share full allergy data with patients.	A	A5	SA3
42	We all agreed to share all laboratory and diagnostic test results with patients except those restricted by state law.	A	A5	SA3
44	Early in the implementation of PatientSite, some clinicians were reluctant to share results with patients, fearing that sharing information with patients could result in a stream of phone calls and emails about abnormal but clinically insignificant results.	A	A5	SA3
45	Should All Laboratory and Diagnostic Test Results Be Shared with the Patient?	A	A5	SA3

49	Should Clinical Notes Be Shared with the Patient?.....Ultimately the patient has the right to examine the entire medical chart, including progress notes. However, the level of explanation required to help the patient understand their contents impedes sharing clinician notes with patients. Currently, most PHRs do not include progress notes for this reason.	A	A5	SA3
50	To add to the complexity some clinicians in our institutions have said they would share some notes with some patients, but not all notes with all patients.	A	A5	SA3
51	Other reasons for reluctance to share notes include the fact that clinicians may use notes to record personal thoughts, not intended to share with patients. Some clinicians may be willing to write notes with patient sharing in mind, but clearly note sharing must be configurable by each note author.	A	A5	SA3
62	Physicians expectations...Before the trial period, physicians were mixed in their opinions about providing patients online access to their records.	A	A5	SA3
72	Physicians expectations...Others….noted that physicians might be more compulsive in their record keeping, knowing that patients might be reviewing their records later.	A	A5	SA3
76	Physicians expectations...Others felt that candor was always best and that the record was ''not a place for secrets	A	A5	SA3
92	One was concerned that it might exacerbate disparities in care, noting that such systems are more likely to be used by socioeconomically advantaged patients and may lead to those patients claiming a disproportionate share of the doctors' time	A	A5	SA3
66	Physicians expectations...Some physicians were concerned that by bypassing them as information gatekeepers, online access to records would distort the clinical encounter. It might create the expectation that patients should set the clinical agenda, forcing the doctor to address patients' issues	A	A6	SA3

	with the record, distracting the doctor from more important issues.			
101	When medical staff members are interviewed about the impact of providing medical records to patients, a frequent concern is the time that they will spend explaining it to patients.	A	A6	SA3
102	In most studies, however, merely giving the patient access to his or her record did not appreciably increase workload.	A	A6	SA3
112	interactions between patients and medical professionals will likely improve because practitioners will need to spend less time gathering patient history and be able to spend more time with patients probing deeper into concerns, questions, and clarification about their conditions	A	A6	SA3
133	there might be "clinically irrelevant" (Tang et al., 2006) personal health data that does not help healthcare providers to determine treatment but helps consumers to modify their behaviors. These personal health data may not need to be made viewable to providers as they clog the traffic to the clinically relevant and critical information for the purpose of delivering care.	A	A6	SA3
139	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..PHRs are unlikely to gain widespread clinician acceptance unless they are integrated into the clinical workflow, such as through integration with the office EHR	A	A6	SA3
140	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..Patient-provider messaging wins over an enthusiastic subset of both patients and doctors, and does not overwhelm the inbox of doctors.	A	A6	SA3
163	Physicians also worried that workflow would be disrupted by another messaging tool unless it was carefully coordinated.	A	A6	SA3

174	physician fears that PG's implementation would increase workload seem to have been unfounded	A	A6	SA3
179	In a previous study, we identified that barriers to increased physician–patient email related to workload, security and workflow.	A	A6	SA3
83	Four of the seven physicians did not notice any lasting change in their style of documentation.	A	A7	SA7
84	Three physicians felt that they had changed their documentation style somewhat to make it more understandable to the patients.	A	A7	SA7
86	Of the three who changed their documentation, each felt that this was a positive outcome. One felt that it would improve the level of honesty in the medical record:	A	A7	SA7
90	They wondered if their experience would be replicated in a practice with fewer personnel resources, a higher patient volume, and a less-sophisticated patient population.	A	A7	SA7
85	None of them viewed that as a problem, and none felt that it cost them a significant amount of time:	A	A6	SA3
82	With one exception, none of the physicians felt that any of these interactions were problematic (confusing, worrisome, overly time consuming, or embarrassing) in any way; instead, they recalled them in a positive light.	A	A1	SA1
23	While consumers appropriately desire protection of their private health information, aggressive protection measures might hamper PHR access by patients and clinicians and impede optimal care.	B	B1	SB1
87	All the providers considered patients' interest in their medical records to be understandable and reasonable.	C	C1	SC1
88	Two offered unqualified support, citing their belief that patients were more involved in their care and benefited from more information.	C	C1	SC1
187	Physicians who do not see patients as their partners are more likely to be negative;	C	C1	SC1

135	Although survey data reveals that there is a lack of awareness among the public, consumers are receptive to this concept, especially when a physician recommends it.	C	C2	SC2
136	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..Physician promotion is key to achieving high consumer adoption in most places.	C	C2	SC2
9	Each constituency—patients, providers (physicians and non-physicians), payers, pharmacies, labs, etc.—must have sufficient incentives in order for them to be willing to participate in a PHR,	D	D1	SD5
108	New policies that compensate physicians for delivering professional services that improve outcomes, regardless of the communication media used, should be developed,	D	D1	SD5
109	New policies that compensate physicians…..Pay-for-performance programs.	D	D1	SD5
10	For provider groups which develop PHRs, there must be sufficient revenue or other return on investment to justify implementing and providing support for the PHR.	D	D2	SD5
47	Should the PHR Include Secure Clinician/Patient Messaging?...... The challenge of secure patient messaging revolves around legal liability and reimbursement for medical advice rendered online.	D	D2	SD5
54	payers are interested in taking advantage of electronic clinical messaging dilemma is how to determine which communication involves sufficient data-gathering, to qualify for reimbursement	D	D2	SD5
177	approximately three-quarters would be willing to increase email use with patients if they were financially compensated for time spent doing so.	D	D2	SD5
4	Nevertheless, some studies suggest that physicians may be more reticent to adopt PHRs than other health professionals, due to concerns about whether adoption of PHRs will create additional work that is not reimbursed.	D	D3	SD4

127	The lack of compensation or other incentives for responding to patient email...are key components of the problem. working with data from new sources…. are key components of the problem.	D	D3	SD4
131	One of the key barriers to the adoption of EMR systems has been the concerns of healthcare providers that the system will not provide sufficient Return On Investment (ROI).	D	D3	SD4
176	This lack of compensation may contribute to many physicians' hesitancy to use PG's general messaging functionality.	D	D3	SD4
158	physicians who are EHR users reported greater awareness of PHR use by their patients	D	D4	SD6
159	we might surmise that physicians favoring HIT use may be encouraging patients to maintain PHRs	D	D4	SD6
22	Other barriers to PHR adoption involve legal concerns on the part of providers….Providers are wary of the legal implications of PHRs, which we don't yet understand. For example, courts might apply negligence standards in cases where practitioners rely on inaccurate patient-entered PHR information to make sub-optimal decisions about care.	D	D5	SD1
57	a reimbursement strategy must be designed to compensate providers for their investment in technology to compensate providers and the delivery of professional services online	D	D1	SD4
61	A fair method of compensating physician professional time for rendering care online is needed.	D	D1	SD4
31	organizational and behavioral issues can delay PHR adoption. Barriers exist both at the environmental level and at the level of individual health care professionals and consumers.	D	D5	SD1
60	modest increase in cost...offset by a reduction in office visit claims	D	D5	SD1
11	non-visit care is not generally reimbursed, so strong incentives exist for providers to delay PHR implementation, even if they already have an EHR with PHR functionality	D	D6	SD5

132	Investment in the development of PHRs is long term and return on investment is not immediately realized. This is because the 'return' is banking on behavior change, i.e., providers' practice pattern and consumers' developing healthier living habits. Behavior change does not necessarily happen on an annual basis but with the right enforcer it has a higher probability of success.	D	D6	SD5
175	Although surveyed physicians identified many benefits of PG, most remain concerned about the current lack of reimbursement for electronic communication with patients.	D	D6	SD5
20	physicians demands for remuneration may be higher	D	D6	SD4
53	One of the major impediments to physician adoption...is a lack of reimbursement	D	D6	SD4
107	Payment policies now discourage the use of online methods of delivering health care: Usually only face-to-face encounters are reimbursed.	D	D6	SD4
164	Some felt that unless their time was reimbursed for Web visits and online communication, they would not favor online communication with patients.	D	D6	SD4
7	studies suggest that physicians may be more reticent to adopt PHRs than other health professionals	E	E1	SE1
8	Studies also report low use among providers	E	E1	SE1
169	physicians are using their own email systems to message patients rather than the general electronic messaging function of an application like PG.	E	E1	SE1
178	would recommend PG to colleagues.	E	E1	SE1
153	Yet, more male physicians than female physicians reported using the patient's PHR information	E	E4	SE7
154	Yet, more male physicians than female having a member of their staff work with the patients and their PHRs	E	E4	SE7
155	Yet, more male physicians than female physicians being capable of electronically integrating PHR information into their own HER	E	E4	SE7
142	A quarter of responding physicians were not familiar with PHRs.	E	E6	SE9

143	The majority (59.5 percent) did not know if any of their patients used PHRs,	E	E6	SE9
148	It is possible that physicians are unfamiliar with the term (PHR) but familiar with the concept.	E	E6	SE9
3	Understanding and addressing attitudinal and physical adoption barriers among patients and healthcare providers represents an important key to achieving widespread implementation and use of PHRs.	E	E3	SE3
150	patients may find that their physicians are not responsive to the sharing of information through technology. As a result, they provide the physician with paper records. This is one possible explanation for the disparate findings between paper records and electronic PHR recognition by physicians relative to their patients	E	E3	SE3
156	Physicians identifying their specialty as general pediatrics reported using PHR information less than their counterparts in general/family practice, internal medicine, or obstetrics/gynecology.	E	E1	SE1
166	identifying and addressing physician concerns will continue to be a challenge.	E	E5	SE8
5	Less information is available about provider attitudes toward PHRs	E	E5	SE8
6	Research on adoption and attitudes should focus on factors associated with attitudes, adoption, and use,	E	E5	SE8
25	Providers and patients will need to develop different mindsets and levels of trust.	E	E5	SE8
122	Provider resistance to……..using new health information technologies.	E	E5	SE8
30	The developers and users of EHRs and PHRs must understand individuals' and clinicians' mental models of healthcare processes, and the related workflows.	E	E2	SE4
33	We propose a governance model with five functions and roles that recognize clinicians and patients as key stakeholders and include them as members. • Information/Assessment Capacity • Policy Formulation & Planning • Social Participation & Responsiveness Accountability • Clinical Leadership	E	E2	SE4

149	There is a clear gap between reported use by patients and perceptions of patient PHR use by physicians.	E	E2	SE4
27	For PHR adoption, change management issues involve providers, consumers, and regulators	E	E2	SE4
147	Almost half (46.6 percent) of respondents reported seeing patients maintain a PHR in paper form.	E	E4	SE10
125	Typically, patients are judicious in their communications and many, if not most clinician concerns are mitigated if they take the first step and start using such systems.	E	E4	SE10
145	Almost all respondents (91 percent) reported observing patients bringing in a written list of the medications they are taking	E	E4	SE10
146	81 percent reported observing patients keeping a written list of their conditions/disease states.	E	E4	SE10
95	Physicians and professional raters have analyzed medical and psychiatric case notes to see whether they are appropriate for patients to read.	E	E1	SE2
128	facilitating informed/shared decision-making are key components of the problem.	E	E2	SE2
35	We all share full text descriptions of problems rather than simple ICD9 codes.	E	E3	SE2
46	Laboratory and diagnostic tests results may present bad news to a patient—a first time diagnosis, a recurrence of a disease or a worsening existing condition.	E	E3	SE2
182	Most felt the medication list, normal studies, prescription refills, appointments, and referrals should be provided to the patients	E	E4	SE2
183	they felt progress notes, abnormal labs, and care over the internet should not be provided.	E	E4	SE2
55	We proposed a set of criteria that is nearly identical to the office-based E&M coding criteria and have tested the feasibility of applying such criteria to a random sample of actual online patient messages occurring through PAMFOnline.	E	E2	SE5
93	physicians expressed concerns initially they viewed patient-accessible records much more favorably after none of these	E	E3	SE1

	concerns materialized			
65	although initially fewer than half of the physicians anticipated that access to medical records would be patient empowering, at the conclusion of the study all physicians did.	E	E5	SE1
89	None felt that patients should be denied access or that facilitating patient access to records was intrinsically a bad idea.	E	E5	SE1
78	In the interviews after the trial period, none of the participating physicians voiced any of the concerns that they mentioned in the initial interviews.	E	E3	SE11
184	They were more positive than negative about the effects of the system,	E	E3	SE11
79	The consensus opinion was that the SPPARO project was invisible from their perspective.	E	E5	SE11
186	physicians not exposed to patient access to their own EMR saw many aspects of the policy as positive.	E	E5	SE11
26	Providers must learn to encourage patients to enter the information accurately, and to trust that information appropriately.	A	A10	SA6
63	Physicians were more likely to anticipate concerns (particularly that access to records would increase patient worry and that patients would find laboratory and x-ray reports confusing).	A	A9	SA9
94	all agreed that they were in favor of giving patients direct access to their test results and clinical notes…	A	A9	SA9
105	Because even general medical records may contain potentially worrisome psychological content, these findings support the practice of allowing doctors to exclude certain content from routine patient review	A	A7	SA7
129	using standard evaluation and management (E&M) coding criteria, many electronic message threads can fulfill standard office visit reimbursement criteria	D	D6	SD4
137	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..Physician acceptance	D	D6	SD4

	requires large up-front efforts to gain buy-in.			
189	but one-third of the physicians believed that the requests were prompted by "litigious motives" or "from the need to obtain secondary gain.	D	D5	SD1
70	Physicians expectations...Whether patient access to records would increase or decrease…..errors was another concern.	A	A9	SA9
71	Physicians expectations...Others hypothesized that patients would identify and correct inaccuracies in their records	A	A9	SA9
99	80% reported that access to records gave them more confidence in doctors and made them feel better understood	A	A9	SA9
141	The Connecting for Health Work Group…….Patients feel more empowered when they have access to their health information, and many early physician adopters find that helpful.	A	A9	SA9
110	Integrated PHRs permit both synchronous and asynchronous communication and provide tools for interactive decision-making	A	A2	SA2
117	The likely payoff…….more efficient use of time	A	A5	SA3
119	The likely…..improved continuity of care through common access to test results. common access to test results.	A	A9	SA9
134	Access by caregivers and healthcare professionals must be established on a need-to-know basis. In the event that the individual is unable to make a determination on access control as in a medical emergency, healthcare professionals and caregivers should have the rights to "break the glass" in order to save one's life	A	A9	SA9
185	subset of 'control' physicians who did not see e-care as improving quality and did not want two-way messaging.	A	A3	SA5
38	All three of our organizations made the decision to share the entire medication list. As with the problem list, no complaints have been received via the formal feedback mechanisms used for communicating issues to our application support staff.	A	A11	SA8

39	Clinicians debated showing medications for HIV, substance abuse treatment and psychiatric treatment.	A	A11	SA8
77	Physician Experience….The principal change in the providers' attitudes after the trial period was that their concerns about potential deleterious effects from giving patients access to their records were largely gone.	A	A9	SA9
103	patient-held records actually improved efficiency because they were still more likely to be available at the time of the appointment than hospital-held records	A	A6	SA3
98	staff had the impression that patient access to the records changed documentation patterns	A	A9	SA9
100	The psychiatric case notes appeared to be even more problematic—among records that were legible, roughly 80% contained entries that were potentially puzzling, offensive, alarming, or upsetting, as determined both by practitioners and patients	A	A1	SA1
121	Provider resistance to PHRs may stem from concerns about new processes and increased responsibilities associated with interacting with patients	A	A6	SA3
138	The Connecting for Health Work Group summarized key findings from the early installation of PHRs (Markel Foundation, 2004) as follows…..If PHR is viewed as beneficial only to patients, it's hard to get physician support.	C	C2	SC2
157	Medical school physicians report more of their patients utilizing electronic PHRs	C	C2	SC2
17	Hopefully, providers will recognize that paying for PHRs may give them a competitive advantage in the marketplace.	D	D2	SD8
130	Although most patients are not litigious, the widespread use of PHRs and other consumer-centric tools raises new potential areas of liability and risk for health care providers, such as the use of incomplete or inaccurate consumer-reported information, online clinician-patient communication, and privacy and security breaches	D	D5	SD1
18	Small incentives to healthcare providers may be enough to encourage them to adopt EHRs that link to PHRs.	D	D1	SD5

19	Many of the putative financial benefits of PHRs only occur when PHRs are tightly integrated with EHRs, so that seed funding of PHRs in practices that operate an EHR might advance PHR adoption to the "tipping point."	D	D7	SD6
106	It is largely because of the seamless integration between the PHR and the EHR systems that 90 percent of physicians were satisfied with the PHR,	D	D7	SD6
16	all the advantages of PHRs for providers depend on the PHR being integrated with the provider's EHR.	E	E2	This item should go in SD6(PHR adoption based on other IT infrastructure)
56	criteria were easy to apply consistently	E	E2	SE5
91	Each questioned whether the merits of the intervention would warrant the resources spent on it	E	E3	SD7(financial gain/ROI)
96	most physicians believed that patients requested to read their records for "further treatment, education, or additional information,"	A	A10	SA6
167	In general physicians are reluctant to adopt new information systems, especially if the systems do not directly benefit them.	E	E5	SE11
188	Patients were more likely than the physicians to anticipate that access to the medical record would be patient empowering.	E	E1	SE1
80	In practice, they were unaware of the intervention and did not feel it affected their workflow	A	A6	SA3

Appendix G: Sub categorization and consensus based naming to each subcategory

Pt provider relationship	10
Decision making	7
Pt provider communication	24
Useful (review it further if there is any other kind of usefulness)	9
Impact on physician workload and or workflow	22
Impact/changes in the documentation pattern or style	4
Opinion/concerns about providing access to the pts	10
Pt education	2
Sharing the medication list	2
Record sharing	13
Total items in performance expectancy	**103**
Extra security measures as barriers in accessing data at the time of need	1
Total items in Effort expectancy	**1**
Physician supporting/not supporting patients to adopt PHR	4
pt demand to access their health information through PHR	3
Total 7 Items in Social influence	**7**
Incentives	13
Reimbursement	12
Litigation concerns	5
Value gain in the marketplace	1
PHR adoption dependent on EHR adoption	2
Total 33 items in facilitating condition	**33**
Low use of PHR among physicians as compared to other healthcare professionals and patients	5
Change in attitude after the actual use (positive change)	4
Change management, criteria for adoption	4
Determining reimbursement criteria	2
Physicians' view on sharing the different elements within patient's chart	6
Physicians find seeing higher use of paper based PHR among their patients	4
Positive/negative feelings for the adoption of PHR	5
Gender specific (PHR adoption among physicians specific to the gender)	3

Future research and recommendations to enhance the adoption of PHR	5
Familiarity with the ePHR concept	3
Actual use	2
PHR will be useful only if integrated with EHR	1
Implementation and adoption only if ROI is observed	1
Total 45 items in "other" category	**45**

CURRICULUM VITAE

Ekta Agrawal
7610 Redmond Ct
Sugar Land TX, 77479
Email- ekta1.agrawal@gmail.com
Phone: +1-317-285-9996 (Cell)

Education:

Master of Science (M.S) in Health Informatics, Expected Dec 2010
School of Informatics, IUPUI (Indiana University Perdue University Indianapolis)

Bachelor of Medicine and Surgery, Amravati University, India, 1996

Professional Experience:

I. Sr. Business Analyst, The Methodist Hospital System, Houston TX
Jan 2010 – Present
Functional lead for the implementation of various Business Intelligence projects. Liaison between IT and business leaders for the design, development and implementation of dashboards, reports and analytics solutions to monitor the performance and outcome.

II. Clinical Application Analyst, Clarian Health Partners, Indianapolis, IN
Aug 2008 – Oct 2009
Implementation and training of Cerner Electronic Medical Record (EMR) with computerized physician order entry (CPOE), system upgrades/ enhancements, production support, project management, work flow analysis and process improvements.

III. Primary care Physician, Sewa Samiti Hospital, India
Jan 1997 – June 2002
Worked as a primary care physician. Responsibilities include examinations, evaluations, assessments, diagnosis and treatment of patient population in inpatient and outpatient care settings.

IV. Resident Physician, Tank Hospital, India
March 1995 – March 1996

Worked as a resident physician in all different departments both in ambulatory and inpatient care, including pediatrics, OB-GYN, Internal Medicine, Surgery, and Ophthalmology on the rotation basis.

Professional memberships:

- American Medical Informatics Association (AMIA)
- Healthcare Information and Management Systems Society (HIMSS).