A pre-post study of Patient Journey Modeling as a change management tool to increase clinician acceptance of EHRs

by

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A Thesis Submitted in Partial Fulfillment
of the Requirements for the Degree of

Master of Health Sciences

in

The Faculty of Health Sciences

Program

University of Ontario Institute of Technology

December 2013

Abstract

The purpose of this research was to determine if patient journey process modeling could act as a change management tool to support electronic health record (EHR) adoption, at a tertiary-care mental health centre. This research study was based on a pre/post design, which evaluated the attitudes of clinicians' pre and post implementation of the EHR. A survey was used to assess the attitudes of various healthcare professionals, such as physicians, nurses and a spectrum of allied health disciplines, at various phases of the planning and implementation process. In addition to the surveys, current and future state PaJMa (patient journey modeling architecture) models representing technology use and process flows of all units were created by observational studies, and served as change management tools. These PaJMa models were then presented as part of an intervention that was held in the form of an educational session to highlight the benefits of technology, and to address the common concerns identified from the initial survey results.

The centre for mental health sciences facility was used as the case study to apply the PaJMa model and assess its change management functionality. Since, the organization was moving from paper to electronic based patient charts it was an ideal choice for this research. It was predicted that the attitudes and opinions of clinicians towards the EHR implementation, and EHRs in general, would change and become more positive with increased knowledge and education. This in-turn would increase EHR adoption and hence lead to a successful implementation.

Keywords: change management, process modeling, IT adoption, technology acceptance, EHR, electronic health records, change process model

Acknowledgements

I would like to express my deepest appreciation to my family and especially my husband, Varinder, for his ongoing support, patience, and encouragement through this long process. As I believe that no matter what great opportunities an individual may be presented with, without the support and sometimes sacrifices from the family, a person cannot maximize those opportunities.

Furthermore, I would like to sincerely thank my thesis supervisors, Dr. Jennifer Percival and Dr. Carolyn McGregor for their ongoing support, encouragement and mentorship throughout this entire process as without their guidance this thesis would not have been possible. Their incredible patience and willingness to revise timelines more than once and help me complete this thesis was greatly appreciated.

I would also like to thank Dr. Ian Fischler for helping with my research study and advocating its importance among his colleagues at Ontario Shores Centre for Mental Health Sciences. I would also like to thank the staff at Ontario Shores for allowing me to conduct my study and contribute to the surveys.

Although this thesis has been a rough roller coaster ride of hard work, commitment and emotions, the end result is rewarding and a big personal accomplishment.

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Publications relating to this dissertation

Conference Presentations

Application of PaJMa in implementation of moving from paper records to all electronic system. Ontario Nursing Informatics Group Education Day, *February 24th, 2011*

Ontario Shores' journey to a fully integrated health record. itHealthcare Canada Conference & Exhibition, *October 2011*

EHR Success: Preparation Vs. Execution, ehealth 2012-Innovating Health e-Care, May *2012*

Posters

Using Technology to Advance Medical Quality in a Tertiary Mental Health Hospital (poster). eHealth 2011-Enabling Healthy Outcomes Conference, May/June 2011

Chapter 1 – Introduction

Over the past few decades, drastic changes have been made to the way organizations and people go about their professional life. Most will agree that the main reason for the changes that have occurred is due to the remarkable advancements in technology. As technology progresses the limitations on what we can do are redefined. Technology has done wonders for the collection, use, and dissemination of vast amounts of information within all business sectors (Buhalis & Law, 2008; Moncrief & Cravens, 1999). Information can be a powerful tool for any business, and the healthcare sector is now beginning to realize its potential use to improve the quality of services they provide. Healthcare professionals now have the opportunity to access and use the collected information quickly to their advantage, as a decision support tool and provide better patient care (Meingast, Roosta, & Sastry, 2006). Due to the technological benefits, many healthcare facilities are looking towards information technology (IT) (Canada Health Infoway, 2011) to help with storing, accessing and using patient data to provide quality care in a timely and efficient manner (Vathanophas & Pacharapha, 2010; Wilkins, 2009; van der Meijden, Tange, Troost, & Hasman, 2001).

A variety of acute to long-term care healthcare facilities are looking towards adopting information technology, such as an electronic health record (EHR), to help with some or many of their process flows as they learn about the benefits that their organization can acquire. Although there are many types of EHRs, which vary in complexity, in the case of this research the EHR that is being implemented in the hospital is to replace the patient's paper charts. The EHR encompasses the complete patient medical information for their hospital visit, from physicians placing orders, nursing and

physician documentation and receiving results and reports when orders are carried out. Some argue that the need for electronic information systems for the delivery of healthcare is hardly surprising, and the movement of healthcare into the hi-tech age was long awaited (Alvarez, 2005).

The demand on healthcare services by patients has continually increased the pressures on the government to provide funding for healthcare (Alvarez, 2005). It's a well-known fact that funding is not always enough as healthcare organizations are always making cutbacks such as decreasing staff. Additionally, it is important to note that these cutbacks are hurting the end user (the patient), and also the frontline staff because now the remaining staff's workload increases. These issues have been constantly arising which has forced organizations to look into solutions that will assist in providing better quality and efficient care at reduced costs (Kossman & Scheldenhelm, 2008). One of the main initiatives that have been on the agenda of almost all healthcare organizations is moving towards an electronic health record (Bhattacherjee & Hikmet, 2007). The push from the government in the realm of eHealth and the funding that is being provided for these initiatives has caused many organizations to jump on the eHealth bandwagon. These organizations are implementing some types of electronic devices to help with their processes, or a comprehensive and integrated electronic health record (Gans, 1997). Although many organizations are implementing EHRs, there is no one common strategy that is being followed, and the lack of change management during these implementations leads to failures (Paton & McCalman, 2008; Kotter, 1995).

EHRs have been in existence for almost three decades and only recently providers are starting to understand and comprehended the benefits of a fully integrated EHR

environment (Morton & Wiedenbeck, 2009). Studies have shown that patients benefit when healthcare facilities move to a paperless environment due to increase in quality of patient care (Lund, 2009). As more studies are being published and more organizations are realizing the benefits, more and more hospitals are implementing healthcare information technology, and this is not limited to North America.

A number of countries across the world have incorporated technology into their healthcare facilities. According to the Canada Health Infoway they have planned for 100% of Canadians to have an electronic health record by 2016 (Canada Health Infoway, 2011). The Canada Health Infoway is an independent not-for-profit corporation created by Canada's First Ministers in 2001, and funded by the Government of Canada. It works with the healthcare community, Canadians, government, and the technology industry to improve access to health information for better care in Canada (Canada Health Infoway, 2012).

eHealth has announced that by 2012, 9000 physicians will be using EHRs (Ontario, 2009). eHealth Ontario is an independent agency of the Ontario Ministry of Health and Long-Term Care. eHealth Ontario enables physicians and healthcare providers to establish and maintain EHRs for all of Ontario's 13 million residents (eHealth Ontario, 2013).

President Bush of the United States had a goal of widespread EHR use by 2014 (Ashish, et al., 2006; Morton & Wiedenbeck, 2009). Similar projects are also under way within other developed countries such as Australia, Denmark, France, New Zealand and the United Kingdom (Alvarez, 2005).

The benefits of information technology (IT) has also been recognized by developing countries and they have also begun to incorporate electronic health records within their facilities including countries such as, Uganda (Fraser, Biondich, Moodley, Choi, Mamlin, & Szolovits, 2005), Kenya (Hannan, et al., 2000), Ecuador (Rafiq, Zhao, Cone, & Merrell, 2004), Peru, Malawi, Haiti (Fraser et al., 2005), and others (Alvarez, 2005). This illustrates that as the advantages of information systems are becoming more evident, the global initiative for embracing technology in healthcare is also growing.

1.1 Research Motivation

Since the benefits of EHRs are well known, it is assumed that organizations would want to implement these successfully, but it is not a simple task as there may be many barriers and obstacles that have to be overcome first. One of the common obstacles reported in literature is the attitude of end users. When the attitude of end users is negative towards technology such as an EHR and resistance towards change is high, it could become very difficult to make projects successful (Brown, Massey, Montoya-Weiss, & Burkman, 2002; Klein & Knight, 2005; Lorenzi & Riley, 2000; Pikkarainen, Pikkarainen, Karjaluoto, & Pahnila, 2004).

Change can make individuals uncomfortable and uneasy about the unknown (Adler, 2007; Paton & McCalman, 2008), as change is complex, dynamic and a challenging process. Managing change in an effective and proactive way is crucial for the success of any type of project to reduce resistance among end users and increase adoption (Paton & McCalman, 2008). Literature supports that resistance to change is common among healthcare workers, which needs to be addressed prior to implementation of an EHR (Bradford & Florin, 2003; van der Meijden et al., 2001).

In order to address the resistance to change, it is vital to first understand the root of the resistance and the attitudes of the end users towards the upcoming changes. Secondly, once the negative attitudes are known and understood, they can be addressed through interventions to improve attitudes about the new technology if necessary; and this should result in successful implementation (Venkatesh & Davis, 1996; Wilkins, 2009). Currently there is limited literature on a defined change process model, or on any combination of multiple tools that assist in understanding the user's attitudes and then strive to change them for successful implementation. In order to bring about successful change in an organization, it is important to ensure that users (healthcare professionals) are well educated and equipped for the new technology well in advance.

Within literature, topics around user acceptance and EHRs are discussed in silos for example, there is literature on technology acceptance models, which helps identify the user's intentions of use (Legris, Ingham, & Pierre, 2003); and there is literature on benefits of adopting an EHR (Alvarez, 2005; Hillestad, et al., 2005); and lastly on how some end users build resistance to IT adoption (Adler, 2007), which usually leads to project failures. Collectively the literature is stating that end user acceptance is one of the most critical factors in successful implementation of any information system. Even though end user acceptance is so vital there is no defined tool, which has been recommended as a change management technique to increase IT adoption that would bring together all the different areas for the common goal of successful implementation. Furthermore, although there are numerous research studies that have been conducted on the benefits of an EHR (Hillestad, et al., 2005; Jha, et al., 2006), user acceptance (Brown et al., 2002; Ballard, 2006) and process modeling (Church, 2001; de Koning, Verver,

Heuvel, Bisgaard, & Does, 2006), a study looking at all of these factors collectively in a healthcare setting is lacking. It is assumed that assessing how healthcare professional attitudes change towards EHRs pre- and post-implementation in a long-term care facility will bring value in understanding the key elements of success. Since the weight of increased user acceptance is heavy on successful implementations, learning how to change end user attitudes to increase IT adoption can have great value to organizations.

Hence there is a great need for researching a change management tool that can be used for IT adoption projects and allow for a comprehensive look at change management, end users, implementation and technology.

This research presents a conceptual model to support change management through the use of patient journey models. Specifically, the purpose of this research is to apply the PaJMa model that will facilitate EHR adoption by addressing the attitudes of users by going through the following proposed stages: current state process modeling; surveying end user attitudes pre-implementation; future state process modeling; intervention; surveying end users post-intervention; implement the EHR; surveying end user three to six months post-implementation. This conceptual model is applied in a case study at a tertiary-care mental health center in order to demonstrate its effectiveness.

1.2 Outcome Measures and Goals of Study

Although the main goal is to develop a strategy to use the PaJMa model as a change management tool to ensure the acceptance and successful implementation of the EHR at a tertiary mental health centre, there are many sub-goals that needed to be achieved in the process.

- Construct current and future state process models accurately to represent current and future work flows in each department at the mental health centre
- Successfully identify the inefficiencies in the current state models so that areas for improvement can be recognized which would include the EHR
- Accurately recognize the issues, concerns and resistance faced by healthcare professionals in regards to EHRs
- Conduct educational interventions/sessions for all healthcare professionals to inform them about the benefits of an EHR and prepare them for the implementation
- Measure the success of the interventions through positives changes in attitudes
- Generalize the process as a comprehensive educational/change management model that could be potentially used by other organizations who are exploring IT adoption projects

1.3 Anticipated Results

Its been shown that by involving end users in the process modeling of current and future workflows, they will feel more valued and part of the organization's initiatives (Adler, 2007; Keshavjee, et al., 2006). During this modeling process the users can visualize how their roles and responsibilities will be affected by the EHR implementation, and this may aid in reducing concerns and improving their perceptions of the future. This will in turn cause the users to support the changes that are occurring (Scott, Rundall, Vogt, & Hsu, 2005; Golden, 2006). Moreover, literature has shown that user involvement during the planning phase gives them ownership of the change (Adler, 2007).

Along side the process mapping initiatives the surveys will help in understanding the attitudes, opinions and concerns that the healthcare professionals may have about the EHR. This will present an opportunity to conduct interventions that will assist in improving their attitudes using the PaJMa models of their own workflows. When users are shown the benefits of an EHR and how it can improve their process flows and bring about better quality of patient care, the user's attitudes will become positive and thus more accepting of the system. This will be assessed by the differences in the survey results pre- and post-intervention and post-implementation.

As a whole this research will highlight the importance and success of the PaJMa model and how it supports change management in achieving successful implementation through greater EHR adoption.

1.4 Research Questions

Question 1: Can an intervention be proposed in the form of the change process model to support the transition from no electronic health record to the use of an electronic health record?

Question 2: Can an intervention during the change process model aid in changing attitudes of healthcare professionals in regard to current or future IT adoption (EHR)?

Question 3: Will increased education reduce resistance to IT adoption and improve chances of technology acceptance?

Question 4: Can process modeling (current and future) patient journeys help identify the inefficiencies in process flows, and can they be useful in educating healthcare professionals about the benefits of EHRs?

Question 5: Can the change management process be applied to support EHR adoption in mental health?

1.5 Research Contribution - Change Process Model

This study aims to fill the gaps in literature regarding the use of a process modeling technique, as a change management tool to increase EHR acceptance. Furthermore, the findings from this study will be recommended for future change management projects in organizations they require the implementation of technology. It is anticipated that the change management tool will help other organizations to obtain successful implementations with high user adoption rates.

1.6 Thesis Structure

The remaining sections of this thesis are compromised of six additional chapters. Chapter two will present a literature review which will introduce previous research studies around change management initiatives, successful implementation, technology adoption, types of models used in healthcare, modeling limitations, PaJMa modeling, and attitudes of end users during IT projects. Additionally, this section will highlight the gaps in literature and why future research is required.

Chapter three is the methodology chapter, which will present the research methods that were used, including instrument construction, site selection, and sampling.

Chapter four discusses the data analysis techniques and results obtained through the surveys that will be conducted in three phases. This section is divided into three sections, which represent these three phases of the study: Phase One-Pre-Intervention, Phase Two-Post-Intervention/Pre-Implementation, and Phase Three-Post Implementation.

The results are discussed and themes regarding the attitudes of the end users are identified and highlighted.

Chapter five discusses the main findings of the research study are linked to the existing literature on change management, use of the interventions and tools to increase end user acceptance of technology.

Lastly, chapter six presents the conclusion of the study and what was discovered throughout the process. It also discusses the limitations that were faced during the study and implications for future research and practice.

Chapter 2 – Literature Review

This literature review chapter discusses the various studies around the factors of obtaining successful EHR implementations and bringing about change in organizations. It begins with a review of change management initiatives and the importance of having a change management process to ensure successful implementations. Moving forward the benefits of information technology, such as EHRs, in healthcare are discussed. The following sections explain the known factors that affect IT adoption and technology acceptance by end users. It was important to review the current literature on user acceptance so that the research questions and study design could be formulated. Other literature found included studies that explored the following factors: interventions, process modeling, attitudes of end users and technology acceptance models. The final section focuses on the need for this research study and the gaps within literature.

2.1 Change Management

Change is inevitable in the technological world, new technological advancements are happening daily and society is trying to embrace technology quickly to reap the benefits. Organizations are bringing major changes to their staff's daily workflows by implementing new information systems. The question is how can organizations manage change in a fast moving environment without losing control or failing (Paton & McCalman, 2008). When organizations introduce something "new", a new product line, a new strategy or a new information system, the end users immediately think about change and start feeling uncomfortable. Hence, change is often known to inspire resistance, fear and sabotage (Adler, 2007). Literature shows that in regards to system success the major challenges in reaching successful implementation are often more

behavioural than technical (Lorenzi & Riley, 2000). Additionally, literature has also emphasized the importance of management involvement and having strong leaders that are facilitators for change (Golden, 2006; Keshavjee, et al., 2006; Paton & McCalman, 2008).

It has also been found that even though a state of the art application can be implemented by following all the right processes; if the end users do not accept and embrace the application into their daily workflow; the project will simply fail and cause frustration among staff. Freudenheim found this exact scenario was noted in Los Angeles at the 870-bed Cedars-Sinai Medical Center where a new system was implemented and being used in two-thirds of the hospital (2004). Doctors' resistance was so high that they forced the withdrawal of the system, as they stated that it was too big of a distraction from their medical duties (Freudenheim, 2004). This is evidence that user acceptance is one of the most important elements in achieving system success. Therefore, information system implementations need to be looked at through the change management lens and not as a purely IT project.

Ballard (2006), who stated that in England ward nurses were working parallel to the computer systems rather than fully incorporating technology into their practice, noted another example of resistance. Nurses were still dependent heavily on verbal reporting and using paper notes that they would carry around, and then come back and enter the information into the system. This caused them to spend more time on documenting and they were not receiving the full benefits of the system (Ballard, 2006). Another study in 2010 stated that when new technologies are introduced which change the traditional practice patterns of healthcare providers that some have been working in for over 20 plus

years it cannot be assumed that change will be simply accepted. Furthermore, when technologies begin to interfere with day-to-day workflow the acceptance rate decreases even further (Esmaeilzadeh, Sambasivan, & Kumar, 2010). All of these studies show lack of user acceptance, and it can be assumed that according to the technology acceptance model (TAM), developed by Fred Davis in the mid eighties, their intentions to adopt the technology prior to implementation was probably low as well. This could be evidence that change management strategies were lacking in these organizations with low user acceptance.

Many individuals just do not like change, they are content in doing their job the way they have been doing it for years and it may be difficult for them to understand why they should change (Wilkins, 2009). Change is inevitable and in a dynamic field such as healthcare, all healthcare providers have already or will soon have to embrace technology. Since the end user satisfaction is so important as it affects the quality of care they provide to their patients, it is crucial for any team who is planning on introducing technology to have a reliable change management process (Jarrar, Al-Mudimigh, & Zairi, 2000). The change management process should be equipped with tools that will help move an organization from their current state (which may be purely paper dependent), to a future state (which will incorporate new technologies) in an organized fashion, and which would yield end user satisfaction and hence, acceptance.

A study by Bhattacherjee & Hikmet (2007) highlighted that the widespread problem of health information technology (HIT) resistance is usually ignored during the HIT implementation plans. It is a crucial area that should be examined since resistance can significantly harm the long-term success and sustainability of HIT. They also

stressed that a better understanding of technology resistance will help develop better implementation tools and better systems that are easily accepted (Bhattacherjee & Hikmet, 2007). From experience I have seen that when management does not notify the end users of the upcoming changes or does not support them during the transition, the major complaint from end users is, "no one told me about this". Furthermore, this also causes a lot of stress on the IT services who are at the helpdesk trying to answer a flood of calls regarding the new technology and responds to complaints and questions about the system. Then management needs to play catch up with unhappy end users which is more time consuming and not cost effective.

Paton & McCalman (2008) have stated that change is assisted by a climate of enthusiasm and participation, which is a dual effort from management and staff. Resistance experienced by end users is usually a result of fear, prejudice, anxiety and ignorance. Understanding the resistance among end users towards technology, an intervention can be put in place to reduce resistance and increase technology acceptance. Literature has shown that people will accept change when they understand that it is necessary and accept the explanation for the need for change (Paton & McCalman, 2008). Although literature is stating the importance of notifying the end users of change and educating them, there is no defined multi-purpose change management tool that is recommended. Therefore, a tool is needed that can be applied during the planning and building phases of the EHR, which will take the end user from their current state and help them evolve to accept the future state to increase EHR adoption rates.

2.1.1 Change Process Models

There are a few change management models in literature that have highlighted the importance of user acceptance, but none of them provide a model design that

recommends a tool that can be used to change the end user attitudes towards EHRs, and also help with the planning and building phases to increase EHR adoption.

Paton & McCalman (2008) discussed the transition management model, which has four interlocking management processes: 1) the trigger layer; 2) the conversion layer; 3) the vision layer; and 4) the maintenance and renewal layer. All these layers are presented to be necessary processes to occur in change management. The first layer is when the organization identifies an opportunity for change. The conversion layer is establishing support in the organization for the new vision. The vision layer involves creating the future vision of the organization and communicating it effectively. Lastly the maintenance and renewal layer is when strategies to sustain and enhance the changes are formed through alterations in attitudes, values and behaviours, and regression back to tradition is avoided (Paton & McCalman, 2008).

Golden (2006) introduced a four-stage change model for healthcare organizations. The stages are: 1) Determine desired end state; 2) Assessing readiness for change; 3) Broaden support and organizational redesign; and 4) Reinforce and sustain change. Golden (2006) has stated that every organization is different and there will be unanticipated events, but this generic model provides a framework for the change to follow for successful implementation.

Keshavjee et al. (2006) did a systematic review of multiple frameworks that have been used for EHR adoption such as Roger's diffusion of innovations model, Collins' risk mitigation model, Heeks 'design-reality' gap model, Kotter's change model, etc. They have stated that none of these models explain many of the characteristics of EHR implementation and EHR use found in the literature. Keshavjee and colleagues analyzed

these models and developed an integrative framework that includes all the important factors required to explain EHR adoption, implementation and use. One of their important factors states, "Sell benefits, manage attitudes, assess preparedness and address barriers". Within this factor they have also stated that demonstrations of the benefits of technology to the end users, such as physicians, nurses and staff, and addressing the common obstacles and barriers which may prevent buy-in can help facilitate the success of change management (Keshavjee, et al., 2006). This is the factor that this research study is addressing with the PaJMa model, as the change management tool, to educate end users and present the upcoming changes.

The different change management models are similar in many ways as they all highlight the importance of end user involvement and their attitudes, but none of them present a defined action plan or tool on how to change attitudes to be more positive once the attitudes are known. The main purpose of this research study is to try to address this gap in literature and define an action plan to change end user attitudes. The proposed action plan will start by obtaining the current state of the attitudes and then test a tool, the PaJMa model, to determine if it will be successful in changing the end user attitudes towards EHRs to increase technology adoption.

2.2 Benefits of IT in Healthcare

Currently, even with the advancements of technology it is still evident that patients' information is spread across the healthcare network and buried in inaccessible paper records (Alvarez, 2005; Smith, Smith, Krugman, & Oman, 2005). This is identified within the 2011 Canada Infoway's report stating that only about 50% of Canadians have an EHR (Canada Health Infoway, 2011). Within the United States most

medical records are also still paper based, which makes it difficult to measure quality, coordinate care, or reduce medical errors (Hillestad, et al., 2005). When information is inaccessible and medical care needs to be provided, it is standard practice to re-order a multitude of tests that are required multiple times by different healthcare providers. This leads to millions of healthcare dollars being wasted daily by reproducing prescriptions and re-ordering diagnostic and laboratory tests due to lost, misplaced or inaccessible results (Alvarez, 2005; Meingast et al., 2006). A study conducted by Hillestad et al. (2005) found that the healthcare industry absorbs more than $1.7 trillion per year and with effective EHR implementation and networking its believed that more than $81 billion could be saved annually (Hillestad, et al., 2005). The key point to note here is "effective EHR implementation and networking" is vital because an EHR implementation with low user acceptance is futile.

Information collected over time can be used to identify patterns of the patient's health and be used as decision support for physicians. Since paper records are not easily accessible and not organized in a structured manner which can be accessed quickly, most healthcare professionals do not go back in the records past a couple of months. Hence, this vast amount of information that is buried in paper charts is not being used to its full potential (van der Meijden et al., 2001), as this information can be used for epidemiological studies and data mining to discover new patterns and knowledge.

2.2.1 IT Adoption.

To address the common issues with paper records mentioned above, many facilities have looked towards adoption of information technology such as implementing EHRs and/or decision support systems (DSS) (Lund, 2009; eHealth Ontario, 2013; Canada Health Infoway, 2012). These initiatives have arisen from previous research that has highlighted

the benefits of EHRs (Kossman & Scheldenhelm, 2008; Menachemi, Saunders, Chukmaitov, Matthews, & Brooks, 2007). Common benefits of EHRs include, support for evidence based practice, increased information access, ensuring completeness of health records and improved organization and efficiency in workflow (Kossman & Scheldenhelm, 2008; Gelbert, 2006). The adoption and utilization of IT has also shown to reduce organizational costs (Esmaeilzadeh et al., 2010) through the use of various applications such as clinical, administrative and strategic tools (Menachemi, Chukmaitov, Saunders, & Brooks, 2008). Besides the improved financial and operational performance that IT can bring to an organization (Menachemi et al., 2008; Meingast et al., 2006), many feel that clinical IT can be used as a strategic healthcare tool to improve clinical decision making in medical practice, and provide efficient medical care in a timely manner (Hillestad, et al., 2005; Esmaeilzadeh et al., 2010).

All these benefits combined have been shown to affect numerous aspects of the quality of patient care such as: improved healthcare delivery (Bhattacherjee & Hikmet, 2007), increased patient safety, reduction of medication errors (Grissinger & Globus, 2004) improved process flows and decreased length of stay (Margrabi, Westbrook, & Colera, 2007). A study conducted by Menachemi et al. in 2008 found that clinical systems have been shown to decrease the occurrence of life-threatening complications such as deep vein thrombosis and serious medication errors. Furthermore, the use of laboratory information systems allowed alerts to be sent to physicians; which resulted in a significant decrease in both the time it took to order the treatment required, or the time until orders were initiated (Menachemi et al., 2008).

Patient safety has become a growing concern and studies have found that hospitals with patient safety initiatives have greater adoption rates as they realize the value of IT and increased patient safety (Wilkins, 2009). A study by Furukawa and colleagues found that the use of IT could improve patient safety in the three stages of medication management process: prescribing, dispensing & administrating (Furukawa, Raghu, Spaulding, & Vinze, 2008). Another study stated that facilities that implemented physician order entry systems showed a 55% reduction in serious medication errors and when used with a computerized decision support system a 85% reduction in overall medication errors was noted (Menachemi et al., 2007). Overall, the use of pharmacy information and dispensing systems, bar-coded medication management systems, and clinical decision support systems resulted in significant improvements in patient care (Menachemi et al., 2007; Furukawa et al., 2008).

IT applications have the potential to bring improvements in the efficiency of processes within the organization, for example, pharmacy interventions may significantly decrease inappropriate medication orders; the time spent on administrative duties and increase the time on direct patient care (Menachemi et al., 2008; Foster & Flynn, 1984). Additionally the staffs' adherence to clinical guidelines may also be improved with computerized reminders (Meingast et al., 2006). Although, IT applications have the potential to improve processes, resistance may be seen among users when they have to change their clinical workflows to accommodate the new technology (Bhattacherjee & Hikmet, 2007; Freudenheim, 2004). From my personal consulting experience in EHR implementations, even though there may be change in the clinical workflows to accommodate the new information system, it gives the organization the opportunity to

standardize processes across all patient units. In a sense, some of these out-of-the-box technology solutions force standardization and aids with improving processes, reducing duplicate work and is more cost efficient. Furthermore, when the processes are standardized across the different areas of the organization, it becomes more efficient for casual staff who works on multiple units, who would save time in not having to learn variances across different areas.

When healthcare providers can access well organized patient information easily and efficiently, this allows for better patient care to be provided (Alvarez, 2005). When healthcare providers have access to patient information they are less frustrated and can concentrate on following their best practice guidelines (Bhattacherjee & Hikmet, 2007).

Although there have been documented benefits of EHRs, there is much controversy over IT adoption. It is important to understand that although a health care facility may implement an information system, the presence of IT does not improve the quality of care on its own (Bhattacherjee & Hikmet, 2007; Ojo, Olugbara, Ditsa, Adigun, & Xulu, 2008). Users have to use the implemented technology; quality information has to be inputted into the system for it to output useful clinical information. Therefore if users such as clinicians do not use the tools available for them, there will be no change in the quality of care. These advantages can only be reaped if management follows up with their staff to ensure proper system usage.

In addition to users not using the system there may be other disadvantages if information systems are improperly implemented. Research has shown that technology also has the potential to increase risk and medical errors (Menachemi et al., 2008) and compromise patient safety if end users misuse the technology, or if the design of the

system is inadequate or faulty. From my experience in EHR implementations I have witnessed that if proper clinical processes, which incorporate the technology, are not put in place the data quality that is entered into the system by end users can decline very quickly, and dual processes or workarounds start to emerge. Additionally, if there is no follow up with the end users, the quality of data that is being entered declines rapidly. If the data quality entered by nurses is lacking this will also decrease physician usage. Furthermore, its important to note that if the system build is not proper some of the same issues that were seen in paper documentation can arise in the electronic format such as, duplicate and inconsistent documentation in different sections of the electronic chart, information getting buried due to ill-organization and duplicate order processing. To avoid these issues it is important to ensure the system is built with end user involvement and aim is to strive for maximum benefits.

Literature repeatedly states that IT adoption success can be measured by the rate of user acceptance and usability by the end user (Esmaeilzadeh et al., 2010; Vathanophas & Pacharapha, 2010; van der Meijden et al., 2001; Wilkins, 2009; Jarrar et al., 2000). Furthermore, literature on technology acceptance models continually states that a good predictor of IT adoption can be measured by users perceived ease of use, and perceived usefulness.

2.2.2 Technology Acceptance Models.

Many studies have shown the use of a technology acceptance model helps encourage user acceptance of EHRs (Vathanophas & Pacharapha, 2010; Chismar & Wiley-Patton, 2002). Davis proposed the Technology Acceptance Model (TAM), shown in Figure 1, as a measure that could explain and predict system usage by the end users (Legris et al., 2003).

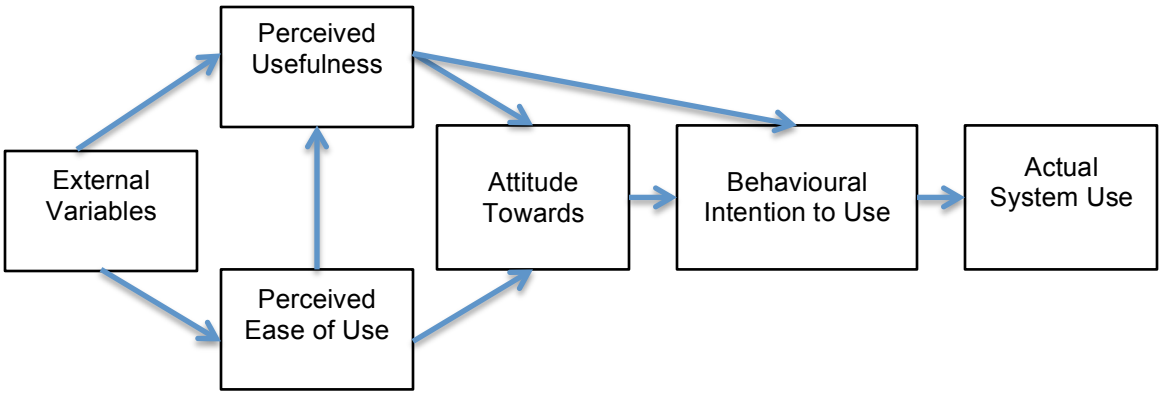

Figure 1. Original Technology Acceptance Model.

There are two variables that Davis suggested which can be used to measure, or predict the user's acceptance of a new information system. These two variables are perceived usefulness and perceived ease of use. Perceived usefulness is defined as, "the degree to which a person believes that using a particular system would enhance his or her job performance". Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort". TAM is a modified version of the generalized Theory of Reasoned Action (TRA), shown in Figure 2. TAM took the TRA model and replaced the attitudinal construct with perceived ease of use, and perceived usefulness (Vathanophas & Pacharapha, 2010; Legris et al., 2003). In past studies the TAM has been widely used by researchers to gain better understanding of IT adoption and its use in organizations (Chismar & Wiley-Patton, 2002). TAM has been applied and tested in various contexts such as corporate and academic settings (Chismar & Wiley-Patton, 2002), furthermore in projects such as online banking (Pikkarainen et al., 2004) electronic mail, web-based e-medical records, personal computer acceptance etc. (Vathanophas & Pacharapha, 2010).

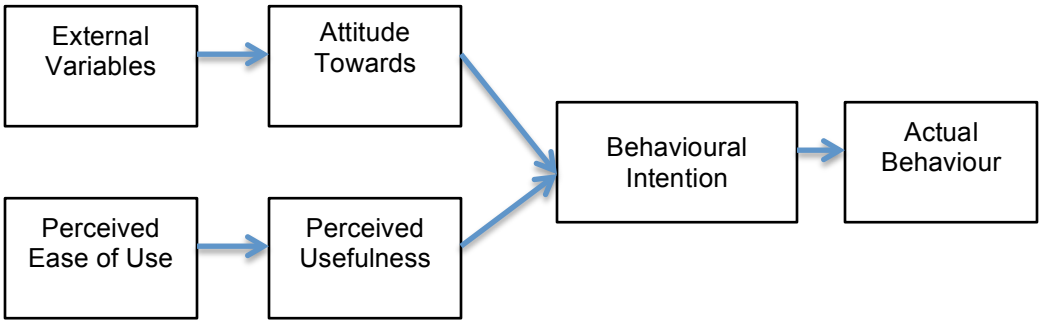

Figure 2: Theory of Reasoned Action.

It has been found that TAM allows the assessment of external variables on internal beliefs, attitudes and intentions. TAM suggests that perceived ease of use (PEOU), and perceived usefulness (PU) are the two most important factors in explaining system use (Legris et al., 2004; Pikkarainen et al., 2004; Esmaeilzadeh et al., 2010; Chismar & Wiley-Patton, 2002).

There is also a newer version of TAM known as TAM2, which incorporates two additional theoretical constructs: cognitive instrumental processes and social influence processes. It states that there are four cognitive factors that influence perceived usefulness which include: job relevance, output quality, result demonstrability, and perceived ease of use. Furthermore, three social forces influence perceived usefulness: subjective norm, image, and voluntariness (Chismar & Wiley-Patton, 2002).

A study by Pikkarainen and colleagues conducted in 2004 with 268 participants used TAM to assess the acceptance of online banking. They found that perceived usefulness and information on online banking were the main factors influencing online-banking acceptance (Pikkarainen et al., 2004). Another study conducted by Chismar and Wiley-Patton examined the extended technology acceptance model (TAM2) to assess physicians' intention to adopt internet-based health applications (2002). They found that

the primary predictor of intention of use was perceived usefulness (Chismar & Wiley-Patton, 2002).

In order to assess how users will accept new technology; information on their attitudes is usually collected through surveys. These surveys include various questions relating to perceived usefulness and perceived ease of use of the new system. Although TAM has been successful in various scenarios there have been very few studies where TAM has been applied to the health sector (Chismar & Wiley-Patton, 2002; Vathanophas & Pacharapha, 2010).

According to literature there are many other theoretical models that have been developed to assess the intention of use and IT adoption (Ojo et al., 2008; Pikkarainen et al., 2004; Chismar & Wiley-Patton, 2002). Models such as TRA, Motivation Model, Theory of Planned Behavior, a combined theory of planned behavior/technology acceptance model, Model of PC utilization, Innovation Diffusion Theory, Social Cognitive Theory and lastly the Unified Theory of Acceptance and Use of Technology which is a combination of all the existing models. It has been found that TAM has been the most used and effective model to predict user acceptance and usage of new technology (Esmaeilzadeh et al., 2010). Although literature showcases this model repeatedly, past research is still lacking studies, which examine user acceptance over different phases of technology adoption. Having a good understanding pre- and post-implementation can allow researchers to understand how attitudes of end users can be affected and changed. Therefore more research in this area is needed, where the TAM model can be applied in the different phases of IT adoption.

This gap in research aided in forming the design of this study and also research question one: Can an intervention be proposed in the form of a change process model to support the transition from no EHR to the use of an EHR?

Understanding the potential benefits of information technology and how it can improve the healthcare setting is an easy task. Literature is showing repeated evidence of clinical workflow improvements and increase in quality of patient care due to technology. But, before reaping the benefits of IT there are many hurdles to overcome and one of the major factors is end user acceptance. As this is often the measure taken to claim success. Increasing user acceptance is assumed to lead to successful implementations.

2.3 Obtaining Successful Implementation

Literature supports that implementation failures are due to lack of adoption by end users and inadequate system builds. Almost 75% of all large health information technology projects fail, and 30% of EHR implementations (Morton & Wiedenbeck, 2009). It is apparent that implementing new technology into a workspace is going to change the traditional practice patterns of users using the system; and management cannot presume that the users will simply accept the new technology (Adler, 2007).

Furthermore, if the new information systems interferes with the users day to day work activities they are less likely to accept it (Esmaeilzadeh et al., 2010; van der Meijden et al., 2001). The healthcare professionals, the end users, play a vital role in the success of a system; if users do not use the new clinical system, all the money, effort and resources used for implementation are insignificant (Pikkarainen et al., 2004; Esmaeilzadeh et al., 2010; Vathanophas & Pacharapha, 2010).

Based on literature, an implementation is successful when there is high end user adoption of the technology (Morton & Wiedenbeck, 2009). Furthermore, a good predictor of future acceptance is the intention to adopt and use the technology by the end users (Lorenzi & Riley, 2000). It is critical to note that in order to get to this phase of increasing the intentions of users, there are many phases that need to be overcome which is part of the analysis and development process prior to implementation. When the goal is to bring about great benefits for patient care and end users alike, then change is inevitable. Therefore, it is important to ensure that proper modeling and intervention tools are used to bring about change. These tools that can be incorporated in a change process model, and aid to reach successful implementation are discussed in the upcoming sections.

2.3.1 Attitudes of end users.

Attitudes of end users towards technology are usually not the first concern of organizations; and the implementation team usually overlooks the concerns of end users due to the time constraints and tight deadlines (Gelbert, 2006; Pikkarainen et al., 2004). It has been found that due to rushed or ill-equipped implementation of EHRs in the past, many health professionals have built a resistance against IT adoption (Gelbert, 2006; Bhattacherjee & Hikmet, 2007). A qualitative study performed in 2005 examined the users' attitudes towards implementation of an electronic medication record system (Scott et al., 2005). Seven main findings transpired: resistance among users increased with software design problems; the decision to adopt the EMR was seen as flawed; doctors productivity was reduced during initial implementation; clarification was required by the systems of clinical roles and responsibilities; no single leadership style was most

favorable; the process promoted a climate of conflict. All these factors continued to increase resistance (Scott et al., 2005).

Some physicians have shown resistance to technology because they don't want to be seen as dependent on technology (Bhattacherjee & Hikmet, 2007). This negative perspective of technology is also due to the culture doctors have been brought up in; their acceptance of technology is not as flexible as in other professions (Esmaeilzadeh et al., 2010). On the other hand, some implementation projects have failed due to inadequate readiness of the users. The persistent problem of resistance towards technology by users is often overlooked during implementation; which is unfortunate because it can hurt the long-term success and sustainability of IT (Bhattacherjee & Hikmet, 2007).

Therefore, it is vital to ensure that the users (healthcare professionals) of the EHR should be included in the pre-implementation phase, so that their concerns and resistance can be identified now and rectified before the EHR is implemented. Having users well prepared for the EHR will increase the success of the project greatly (Scott et al., 2005). In prior research on IT resistance has been limited and fragmented and research on IT usage has ignored the problem of resistance (Bhattacherjee & Hikmet, 2007). Furthermore, there is a lack of studies that have assessed the attitudes of users from pre-implementation to post-implementation. Hence further research in the area of resistance towards IT over the planning and implementation phases is needed to aid future IT adoption projects. As a result of this literature review, in order to determine if resistance can be minimized by end users, this research study formulated research question 3: Will increased education reduce resistance to IT adoption and improve chances of technology acceptance?

2.3.2 Modeling/Intervention Tools.

Since the 1970s and 80s as the office automation systems and technology have increased, so did the need for business process modeling (Mendling, Reijers, & van der Aalst, 2010). It is becoming more and more evident that the introduction of technology has not simplified processes and instead has sometimes increased complexity (Poole, Hinton, & Kraebber, 2010). Therefore, process modeling techniques are increasingly being used to identify the inefficiencies in daily workflows and as part of quality improvement projects (de Koning et al., 2006; Kuo, Borycki, Kushniruk, & Lee, 2011; Fairbanks, 2007). From redesigning processes to introducing new ones, numerous process modeling tools have been used in all sectors from industrial, financial to medical (Kock, Verville, Danesh-Pajou, & DeLuca, 2009). Furthermore, conceptual modeling has become an area of research for many in the information systems arena (Mendling et al., 2010).

Presently, there is an emerging need among healthcare systems around the world to improve the quality of service delivery (Joshi, McGregor, & Percival, 2010; Ojo et al., 2008; Rafiq et al., 2004; Fraser et al., 2005); and since the role of process modeling has been recognized for effective quality improvement, the application of such tools to healthcare is inevitable (Jun, Ward, Morris, & Clarkson, 2009). There are many studies presenting the use of different types of models in healthcare such as, Lean (Fairbanks, 2007), Six Sigma (de Koning et al., 2006), PaJMa (Joshi et al., 2010), Swim Lane and others (Jun et al., 2009), as tools to understand process flows and aid in the implementation of information systems.

2.3.2.1 Types of Models.

The Lean methodology emerged within the Japanese automobile industry shortly after the World War II in the 1930s and Motorola originally introduced Six Sigma in the 1980s

(Kocakulah, Brown, & Thomson, 2008). The ultimate goal of these approaches is about serving the customer more efficiently and effectively, elimination of wastes and growth of a customer base (Kocakulah et al., 2008). Over time both approaches have made their presence known in the manufacturing environment and are now also widely used in administration and service areas (de Koning et al., 2006).

Lean is referred as an integrated system of principles, tools, practices, and techniques focused on reducing waste, managing variability in production flows, and making work flows function at optimal levels. Lean Thinking is also known for its value stream maps, which represent value- and non-value-added activities. Value added activities are such that work towards achieving what the customer wants from a product or service; hence all other remaining activities are non-value-added (Kocakulah et al., 2008). Lean is recognized for resulting in standard solutions to common problems and focusing on the customer. On the other hand, Lean's weaknesses are on organizational infrastructure, analytical tools, deployment plans, quality insurance, and control (de Koning et al., 2006). Due to the weaknesses of the Lean model, it would be difficult to use it as the tool to display healthcare processes to end users and show them how their role would change. This is due to the fact that the Lean model does not display all the components of the healthcare process; such has user involvement, to give the end user a comprehensive picture.

The Six Sigma approach also has a customer-driven focus but is also concentrated on decision making after performing detailed analysis of quantitative data (de Koning et al., 2006); and places importance on cost reduction. Six Sigma is applied in five phases known as DMAIC: define, measure, analyze, improve, and control. These five phases are

followed to resolve problems that arise no matter how large or small. Six Sigma's strengths lie in its structured, analytic, and rational approach to problem solving, and its strong organizational framework for its deployment. However, one of its apparent weaknesses is its complexity; when Six Sigma is applied to simple problems it may be considered as over doing it (de Koning et al., 2006).

Due to the strengths and weaknesses of both approaches it was found that these approaches compliment each other and therefore have been used in combination in organizations such as General Electric (de Koning et al., 2006). Over the past decades these methodologies have shown to improve processes among manufacturing companies and just recently hospitals are applying the same basic tools to increase efficiency, enhance financial performance and improve employee engagement (Ogden & Moncy, 2011). The application of Lean Six Sigma is becoming more evident in healthcare; an example of this can be seen in Netherlands at the Red Cross Hospital. At this hospital significant changes were achieved so that the operating theater was used to its maximal potential and a financial savings of two hundred thousand pounds was achieved (de Koning et al., 2006). Another study done at the Southwestern Vermont Medical Center showed an improvement of patient throughput and increased teamwork (Fairbanks, 2007). Another recent example of workflow improvement with Lean Six Sigma was seen in a post-anesthesia care unit (Kuo et al., 2011).

A study conducted by Jun et al. in 2009 looked at eight distinct modeling methods in three different healthcare scenarios and evaluated how health care workers perceived them. The eight types of diagrams that were used included: stakeholder, information, process content, flowcharts, swim lane activity, state transition, data flow and

communication diagrams. It was found that although each diagram had its advantages and disadvantages, they were each helpful for a specific purpose, shown in Table 1 below. Since each diagram had its own benefit there was no single model that could cater to the overall care processes so they could be analyzed as whole rather than in segments. Therefore, the study concluded that for healthcare processes various diagram types are needed to capture in depth process flow information in order to allow for quality improvement practices (Jun et al., 2009).

Table 1

Diagram Evaluation Results from Jun et al's Study (2009)

Diagram Type	Helpful for specific purposes
Stakeholder	Defining system boundaries/Identifying key stakeholders
Information	Understanding document standardizations status, level of electronic document usage
Process content	Understanding a detailed task structure
Flowcharts	Understanding an overall process
Swim lane activity	Understanding roles and responsibilities
State transition	Understanding a process in a patient-centered way
Data flow	Limited in describing overall care processes
Communication	Understanding communication and interactions between stakeholders

Another study conducted by Kock and colleagues looked at models at a higher level by examining them by their orientation: communication flow orientation and control orientation (2009). The two types of models were assessed on their successful use during business process redesign. The communication flow models represented the communication interactions within the business process, which included conversations, memo exchanges, and form flows. The control orientation models concentrated on activity flow modeling and had a much lower degree of communication flow orientation.

Seventy-eight individuals across 18 organizations were involved in this study and all used both of the modeling approaches (Kock et al., 2009). It was found that business process models with greater communication flow orientation were seen to be more accurate than models with a lower communication flow. Kock et al (2009) stated that a business process model should yield all the necessary information that is required to execute quality improvement projects, and result in more efficient workflows for the organization involved. Furthermore, the quality of a model is based on the degree to which the following attributes are present: ease of generation, ease of understanding, completeness, and accuracy. Hence the communication flow model has the elements of a high quality model (Kock et al., 2009).

2.3.2.2 Modeling Limitations.

Literature has highlighted that the actual practice of process modeling is questionable and little is known about it (Mendling, Reijers, & Recker, 2010). It has been found that even though there may be some guidelines or frameworks to follow during process modeling, there is lack of empirical evidence supporting these guidelines (Mendling et al., 2010).

It is important to understand that the choice of modeling technique that organization makes, is likely to influence how the business processes will be examined and which elements will be the target of improvement. Currently since there are a vast number of models to choose from, it is even more complex and difficult to find the right model for the right process (Kock et al., 2009). Since most of these models have originated in the manufacturing sector and now are being molded and applied to the healthcare sector, it leads one to the question if they are healthcare appropriate.

Although research has shown the validity of some models through research, such as communication flow models being quality models; they still seem to be missing the

overall process. Literature is repeatedly presenting the use of multiple models for modeling healthcare processes, i.e. Lean and Six Sigma have often been coupled together to cover all elements of a process; or data flow diagrams with flow sheets and transition diagrams being used in parallel to capture the big picture.

With current initiatives in the healthcare sector where many healthcare facilities are moving towards implementing EHRs more and more process modeling initiatives are required to aid in successful implementations. These tools have focused on helping organizations examine current processes for inefficiencies and implement new workflows, which usually includes introduction of new technology. However, these tools have not really been applied to help end users accept and understand the upcoming changes. The uses of patient journey models that are patient centered are still limited in literature. A few studies have used patient journey models to help identify inefficiencies in process flows and/or aided with redesigning of clinical workflows (Marshall, Vasilakis, & El-Darzi, 2005; Joshi et al., 2010; Percival, Cately, McGregor, & James, 2008).

Process modeling of clinical workflows as they are and not as they should be is vital to understand where the inefficiencies are and where new processes have developed over the years (Ben-Tovim, Dougherty, O'Connell, & McGrath, 2008) . Furthermore, integrating visual modeling and engaging practitioners in the design of future flows we will provide end users with ownership of the process; which has been shown to be an effective strategy for improving acceptance of change (Ben-Tovim et al, 2008). Furthermore, holding interventions and using conceptual models which allows the clinicians to see overall process changes visually, have a much more dramatic and

informative impact; compared to reading manuals or technical write-ups (Jun et al., 2009).

2.3.2.3 PaJMa Modeling.

Although there has been a rise in IT practices, there is a lack of research presenting evaluation techniques and direction on how evaluation should take place (Oroviogoicoechea, Elliott, & Watson, 2007). In the past many organizations have tried to rush through this process causing them to miss out on many specifications due to miscommunication of policies and practices, which has led to loss of money, time, and resources. In order to address this issue, McGregor and colleagues have introduced a structured way to demonstrate the functional requirements by using patient journey models (McGregor, Percival, Curry, Foster, Anstey, & Churchill, 2008). The traditional methods have concentrated on the technical aspects of the systems and have not had enough involvement from general health practitioners. Involvement of health practitioners from the early stages is vital as they are the main stakeholders and the ones who are going to use this system. In comparison to business information systems, the healthcare setting has to account for many other factors such as, the wide span of user roles that must be considered and most importantly the patient's cultural, emotional and medical needs. The PaJMa model allows for each healthcare process to be presented with all these factors included in a structured view (Cately, McGregor, Percival, Curry, & James, 2008; McGregor et al., 2008).

Although the PaJMa model is fairly new to the research world, it has shown its effectiveness in various areas. The PaJMa model has addressed the common limitations of current process models with its ability to capture the overall process. Limitations of models were mentioned in Jun et al's study that although there are multiple types of

models that can be used, none of them capture the holistic view of the clinical workflows (2009). Since the PaJMa model is patient centered it allows the modeler to capture all the relevant information for all the stages the patient goes through. The study done by Jun et al in 2009, highlighted many types of models and identified that no one model was comprehensive enough to include the full picture of the clinical workflow. The study also highlighted that there are no set easy guidelines on how to gather information and process map. The PaJMa model addresses these current questionable guidelines in literature with its multi-layer and structured approach, which reminds the modeler to capture certain information to complete the model. The characters of a quality model include: easy to model, easy to understand, complete and accurate; the PaJMa model has shown a high degree of all of these attributes (Percival et al., 2008). Due to its ease of use, easy to understand and healthcare focus it can work in various dimensions. It can be used as a change management tool, as an educational medium or as a technology acceptance model.

There is very little research on using this model as an education medium and change management tool that could help educate end users about upcoming changes to their workflows and increase EHR adoption. Since this model is being widely accepted by frontline healthcare professionals, its potential as an education and change management tool has to be explored further with more extensive research (Percival, Cately, McGregor, & James, 2008). To have the opportunity to apply this model through a full implementation can bring an opportunity to learn about its effects and how it can be used at the different phases of change in any organization. Although, other models such as Lean, Swim Lane etc. may be helpful in defining processes, none of them look at the

entire process and include a holistic view of the workflows as does the PaJMa model, making the PaJMa model more favourable for this study. The literature on different types of models and the benefits of the PaJMa model, led to the formulation of the research questions in this research study. It is assumed that there is value to apply the PaJMa model to the full implementation and assess if it will identify inefficiencies in current clinical workflows and serve as a change management tool.

2.4 Conclusions and Impact on Research

Past research has addressed many issues with IT adoption, which has been presented in the literature review above. The change management section has highlighted that there is not a formalized change process model that will help with the transition to an EHR, and hence the first research question was formulated.

The literature review around attitudes of end users and IT adoption has highlighted that efforts have not been put on changing the attitudes of end users to increase acceptance; and therefore research question two was formulated to test if this is possible as this has become one of the biggest reasons of project failures.

The literature review section above that examined the benefits of IT in healthcare, IT adoption and technology acceptance models, aided in formulating research question three which will test if increased education will reduce resistance to IT adoption.

Research question four was developed to test if process modeling will help identify inefficiencies in process flows and aid in educating end users. The reason behind the importance of this question was derived by reviewing the different models in healthcare and the gaps that were seen in modeling techniques that were specific to

healthcare. Therefore it was important to test the benefits of the PaJMa model and how it can help with educating healthcare professionals.

Lastly, question five addresses if a change management process can be applied to support EHR adoption in mental health. This will tie together all the major gaps seen in literature and test the change process model's efficiency on the organization being used as the case study. This was important, as all these gaps have mostly been addressed independently of each other in past studies.

Furthermore, there is a gap in literature regarding pre-post longitudinal design studies that follow the end users over a period of time and capture the changes in their attitudes. This gap highlighted in the literature review has aided in the study design of this research. This research study is aiming to define a change management strategy using the PaJMa model to increase EHR adoption. The intention is to educate and prepare end user for the EHR by understanding any concerns they may have. Once their concerns are addressed through educational sessions, it is presumed that they will feel at ease and be more prepared for the EHR. Furthermore, surveys will act as a guide to assess the views and attitudes of users and according to Vathanophas & Pacharapha, if the perceived ease of use and perceived usefulness of users is high, it can be assumed that the acceptance rate would also be high. If acceptance is high it can be assumed that using process models and educational interventions are useful tools in preparing users for system implementation.

A study conducted in 2001 assessed the attitudes of end users towards paper and electronic records (van der Meijden et al., 2001). They conducted two questionnaires and two interview sessions prior to development and prior to implementation. They were

hoping to find an increase in positive attitudes prior to implementation by involving a few users that would act as change agents, but they did not see a significant difference. Furthermore, they did not conduct any questionnaires or interviews after implementation. Assessing the effects of the PaJMa model on end users and how it can be used as an aid within a change process model is worth investigating, so that other organizations can use this tool to help with their implementation projects and end user acceptance goals (van der Meijden et al., 2001). Hence, looking at the change in attitudes of end users over all the phases of implementation is required.

Favourable study results can become very useful for other organizations that are trying to implement an EHR and want to prepare their end users for the change. In order to achieve improvement, change is necessary and hence the change process model can significantly help during their implementation process. Furthermore, this research can provide knowledge to the academic world that other researchers can build upon it to find better tools and make the current ones more resourceful.

Chapter 3 – Methodology

This chapter provides a detailed review of the research methodology used in this study, including instrument construction, site selection, and sampling. The main purpose of the study was to investigate the perceptions and attitudes of healthcare workers at the mental health facility regarding EHRs over the different phases of implementation, and find answers to all the research questions presented above in the introduction. As well as, allow for the development of a generalizable change process model for supporting the implementation of an EHR to avoid implementation failures.

3.1 Case Study within Long-Term Care Context

Mental Health Sciences has evolved greatly over the last century, from society being afraid of individuals with a mental health disorder and labeling them with remarks of sorcery or witchcraft, treating them as outcasts, and locking individuals up in asylums, to present time where society has started to understand these health disorders and started caring and helping them cope with their conditions rather than punishing them. One such facility is known as Ontario Shores Centre for Mental Health Sciences (previously called Whitby Mental Health Centre), located 50km east of Toronto. It was in 1912 when the provincial government purchased 640 acres of treed and fertile farmland that slopes to the shoreline of Lake Ontario. The philosophy of Ontario Shores was to invite patients who had been housed in dark, damp asylums with barred windows, and offer them sunshine, fresh air, space to walk and an opportunity to heal. In 1919, when Whitby Psychiatric Hospital opened, a new era in the humane treatment of the mentally ill began.

Now it's been almost 100 years and many changes have occurred over time, although the philosophy to treat patients has always been recovery focused. Alongside

the renovations and re-builds that took place, the patient information collected over the years has been growing. Some patients have been there for over 15 years and the information collected is stored in multiple charts in the health information management department. The files and information collected has been increasing tremendously and space to store all these paper files is becoming overcrowded and collecting dust. The information collected in the past is becoming useless because it is not easily accessible to the health providers, and therefore they do not put the effort to go searching for it. The providers may feel that there is no value looking back at information collected a few years back.

Previous research has shown information technology is a powerful tool in the healthcare sector, as health professionals rely on accurate information to optimize patient care. Due to the various benefits of technology many healthcare facilities utilize it in tracking, storing, accessing and trending patient data over time to provide quality care in a timely and efficient manner. Ontario Shores recognized these benefits and believed that the information that they were collecting had more potential and could be used to provide better care, and therefore they embarked on a project to implement an electronic health record in 2007.

This facility was moving from completely paper based to a completely electronic health record, and hence was seen as a perfect opportunity to follow the end users throughout the process and discover how their attitudes would change or stay the same over the entire implementation process.

3.2 Overall Approach

During the literature review it was evident that there is a lack of studies that have been conducted pre- and post-interventions to increase user acceptance of EHRs. In this study quasi-experiment methods were used. A quasi-experimental study is a type of evaluation that has been applied often to determine whether a program or intervention has the intended effects on a study's participants (Harris, et al., 2006). The participants who receive the intervention are known as the treatment group. Although there are many types of quasi-experiments, for the purpose of this study the "separate sample pretest-post-test design" was used. This design has not been considered a strong design but it is usually used when the population is large, and the findings obtained from the samples are usually generalized to the greater population. Additionally, by utilizing the quasi-experimental methods it reduces the threats to external validity. Furthermore these methods are efficient in longitudinal research that continues over a longer period of time and is done in different environments (Cooper & Schindler, 2003).

The overall approach for this case study research based project was to use the quasi-experimental design with a longitudinal research approach (Cooper & Schindler, 2003) that ran parallel to the different phases that the mental health facility was going through to implement an EHR.

The EHR being implemented was a fully integrated system that allowed physician orders, full nursing and physician documentation, and receiving results and reports from all the tests performed. Hence, this EHR would replace the patient's paper chart and allow for this 800+ staff organization to go paperless. For the purpose of this research study the following change process model was tested which included the following seven

stages: 1) current state process modeling using the PaJMa model; 2) round one survey deployed to collect end user attitudes towards technology pre-intervention (Appendix A); 3) future state process modeling; 4) conduct an intervention by educating end users about benefits of technology; 5) round two survey to collect end user attitudes towards technology post-intervention; 6) implementation of the EHR; 7) round three survey deployed to collect end user attitudes towards technology three to six months post-implementation.

Within the first stage of the study, current patient journey models were created representing existing technology use and process flows of various clinical workflows to capture the current state.

Within stage two of the study, the first round survey was deployed three-six months prior to implementation of the EHR to capture background information and current attitudes of the participants towards EHRs, management support, and training. The surveys were being run in parallel with the current state process mapping.

Within stage three of the study, which ran parallel to stage two, the current state models were then analyzed for inefficiencies, duplications and any gaps in process flows. The future state models were then designed with the engagement of healthcare practitioners to eliminate these inefficiencies. For example, the allied health referral workflow was reduced by 50% because the EHR was going to: 1) reduce the time it takes to fill out the appropriate forms and 2) eliminate the transportation of the form through office mail, allowing for a much faster referral process and communication between patient units and the allied health disciplines.

In stage four of the study, based on the analysis of the round one surveys, an educational intervention was held to educate the clinical staff on the benefits of the EHR and address any concerns, resistance, or fears they may have. The constructed PaJMa models were used as an educational aid to represent the health professional's role in various clinical workflows, and the future state models (which included the EHR) represented how their role would change. Additionally, how the quality of patient care will improve in the future was highlighted.

In stage five of the study a follow-up survey (round two) was executed after the educational intervention and prior to implementation, to capture any attitude changes towards the EHR. Capturing the changes in attitudes will aid in measuring if the intervention had an impact and if it served as a change management tool.

Within stage six of the study, once all training of staff was complete the mental health facility's health informatics team implemented the EHR to all inpatient units.

Lastly in stage seven of the study, once the EHR was in production for about three to six months and the end users were utilizing it, the round three survey was deployed. This allowed another snapshot of any attitude changes towards the EHR post-implementation. The collection of these surveys was also important to measure the impact of the system on the attitudes compared to round one and round two.

It is assumed that in the case of the organization mentioned in the case study, it has a large population and the sample sizes that will be obtained are predicted to be a good representation of the population; which will allow the generalization of the findings. This Pre/Post intervention and post-implementation approach will be explained in more

detail in the upcoming paragraphs and can also be seen below in Figure 3 in the form of a PaJMa model.

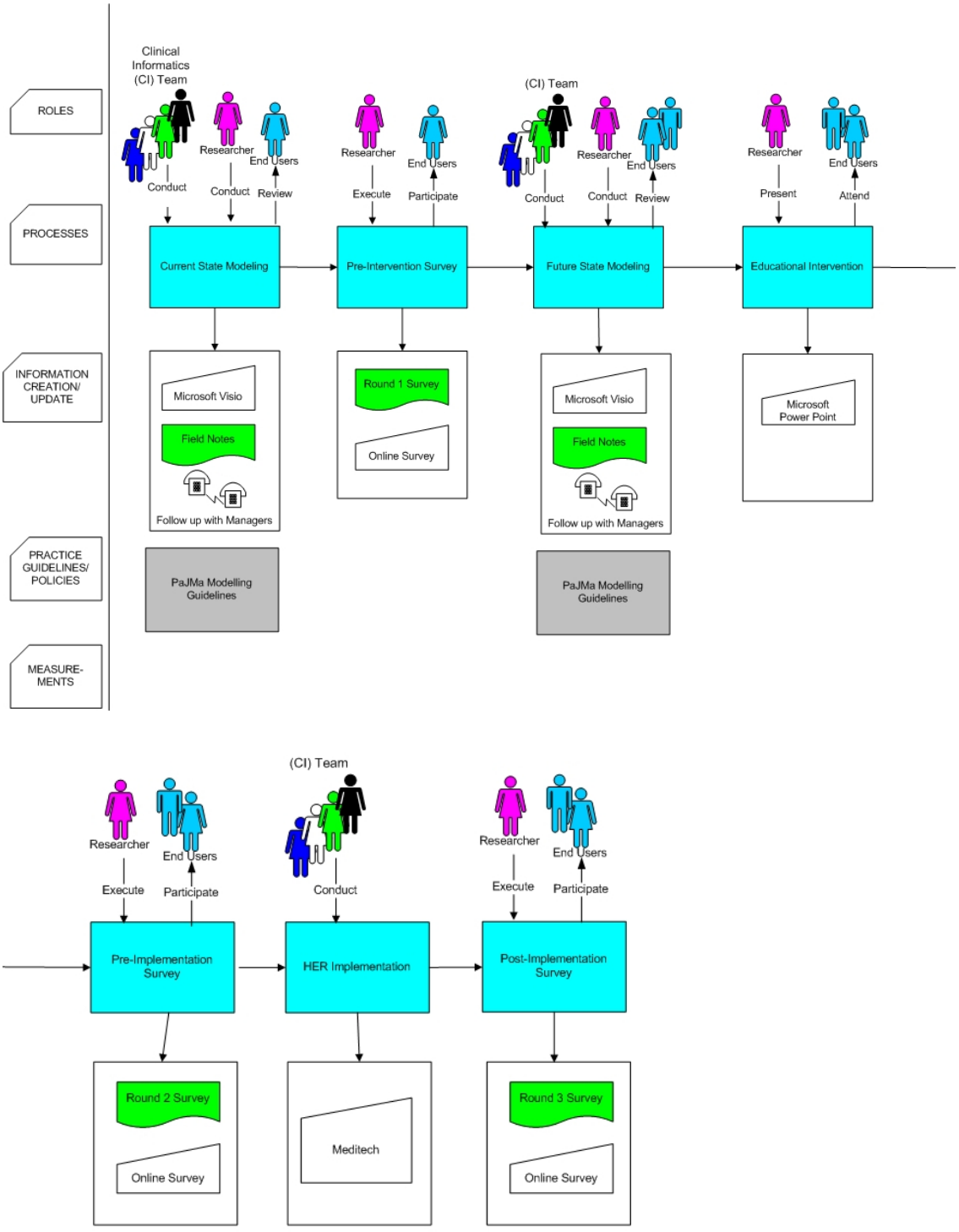

Figure 3. Research methodology in form of a change process model using PaJMa.

3.3 Survey Model and Design

Surveys are known to be a common (Church, 2001) versatile tool for collecting abstract information of all types. They are also effective in learning about the opinions and attitudes of the participants over time (Church, 2001; Cooper & Schindler, 2003). Due to the large number of potential participants for this case study, a surveying tool was found to be the most time and cost efficient (Cooper & Schindler, 2003; Schmidt, 1997) way of learning about their views and attitudes about the upcoming EHR.

The survey was made available to any healthcare professionals within the Ontario Shores Centre for Mental Health Sciences. They had the option to participate in the study on a voluntary basis and anonymously. Total number of eligible population was 800-900 healthcare workers, which included nurses, allied health, and physicians in which it was predicted to enroll 20% of the total population (160-180 participants). This sample size is assumed to capture all the different types of roles (i.e. nurses, allied health and physicians) so that the findings can be generalized to the entire population.

A unique identifier was not used to link the data from one phase to the next; this was due to the challenge of getting participants to commit to participating in all phases and also the concerns about privacy from REB at Ontario Shores regarding the ability of management to be able to determine who was resisting the EHR.

The three-step method of Cooper and Schindler (2003) was applied in the design of the research instrument, which is explained in detail below.

3.3.1 Step 1-Survey Design Strategy.

The survey was constructed using the three-step approach. In step one the investigative questions were explored so that the data types, communication approach and process structure could be defined. The data types that were used for this survey were mostly

nominal, which included questions such as gender, role; and the ratio data type questions collected information around age and years worked. Collecting this type of identifying data has been found to be standard in all previous studies found within the literature review. These data types (especially nominal and ordinal) allow for categorization so that the results can be presented in themes and the different relationships between them, for example, roles and mobile technology use or years worked and computer usage etc.

Although nominal scales are the least powerful of the data types (Cooper & Schindler, 2003) it was crucial to capture information on variables such as gender so that during analysis, information can be grouped into categories. Grouping the information in categories and identifying themes can help with generalizing the findings to the entire population. Furthermore, cross tabulations of these and other variables can shed light on some important data patterns. The main objective of the survey is to collect information on clinicians over time, therefore using ordinal data was appropriate because it can also be grouped into categories to identify common themes.

The communication approach that was chosen was electronic, administrating online surveys due to the number of potential participants. Although there are pros and cons to using surveys, the disadvantages and the measures taken to reduce the effects of the disadvantages is discussed in the next section. Lastly, the aim was to make the questions structured, giving the participant pre-defined options to pick from; this would allow the results to be measured in a structured way across the three steps. Furthermore, a few unstructured questions were incorporated to allow the participants to convey any attitudes or opinions in their own fashion.

Compared to personal interviews, focus groups or telephone interviews which would take too long to complete (Cooper & Schindler, 2003); it was found that using the internet as the communication method was found to have many benefits. There are many advantages to online, self-administered surveys, which include: accessibility, economical (Church, 2001), rapid data collection, short turn around time of results, and anonymity for respondents (Cooper & Schindler, 2003; Schmidt, 1997; Church, 2001). In addition to the advantages there are a few disadvantages such as: they can be easily ignored, yielding a low response rate; the interviewer is not present to probe the respondent for further explanation of their response; often the survey respondents represent extremes of the population thus skewing the results; some direction through the survey tool may be needed; computer security; and the need for the least distractions while completing the survey (Schmidt, 1997; Cooper & Schindler, 2003).

Cooper and Schindler (2003) have suggested various criteria to look at when using a communication method. When the survey instrument was being developed these criteria were used to help with survey design choices. Furthermore, the common disadvantages found in literature were evaluated and measures were taken to reduce these disadvantages and ensure quality research design and data. To reduce costs an online survey was created due to the large sample pool, which also helped with anonymity of the respondents. Furthermore, the survey was constructed to ensure the respondents can save their responses and come back to finish it in segments. The criteria survey design choices, disadvantages and measures taken to reduce the disadvantages can be seen in Appendix B.

3.3.2 Step 2-Survey Design Strategy.

In step two the measurement questions were constructed. Measurement questions are required and were the core of the survey in order to collect information to answer the research questions of the study.

A majority of the questions were structured using the Likert scale of 1 to 5; which represent strongly disagree to strongly agree respectively. The General/Comments category had a couple of open-ended (unstructured) questions for participants to express their views on the EHR. All the questions can be seen in Appendix A.

In order to capture all the data needed from the participants, questions were divided into three categories, as suggested by Cooper and Schindler (2003): administrative, classification and target questions. The administrative questions are usually not answered by the participant, therefore in this case study the online survey automatically assigned a survey id, since it was anonymous no other information such as location or ip address was collected. Many classification questions were developed to collect information around age, years of work experience, job description etc. These classification questions were important to collect so that the findings could be grouped together to determine themes, which would allow the generalization of the results to the rest of the population. Lastly, the target questions were constructed using a rating response strategy to capture the attitudes of clinicians towards electronic health records. These target questions will address the objectives of this study so that data around attitudes towards EHR can be collected, also specifically around utilizing technology, if technology is aiding with patient care workflows and its perceived usefulness.

The survey was divided into 11 categories. The classification questions were included in the first two categories listed in the table, i.e. background and work related

and personal computer usage. The remaining categories fall under the target type questions. These categories included various variables that can significantly sway the success of an information system in any direction and for this reason they were included in the survey questions.

The perceived ease of use and perceived usefulness categories were important because they are strong predictors of future user acceptance; this has been repeatedly highlighted in past literature (Wilkins, 2009; van der Meijden et al., 2001; Pikkarainen et al., 2004; Legris et al., 2004). These questions types were used to measure the users' perceptions so that potential user acceptance can be measured.

Due to the repeated application of TAM in relation to attitudes of users towards technology and its successful application; the use of TAM in this research study to assess the attitudes of clinicians towards EHRs seemed feasible. Table 2 below presents the 11 categories of the survey, the question types and which research questions they will help in answering once the data is collected.

Table 2

Survey Categories and Supported Research Questions

Question Categories	Question Types	Research Questions
Background	Age, Sex, Department, Typing skills, Internet usage, etc.	All
Work Related & Personal Computer Usage	Users were asked their average computer usage	All
Management Support	Users were asked to rate their expectation of the management's support during the EHR implementation	Question 3
End User Involvement during Implementation	Users were asked to rate their expectation of their involvement during the implementation phase of the EHR project	Question 3
Adequate Training	Users were asked to give their opinion (expectation) about the training they will receive on how to use the EHR	Question 5
End User's Autonomy	Users were asked to give their opinion about their autonomy	Question 1 Question 2 Question 3
Worker-Patient Relationship	Users were asked to give their opinion about the healthcare worker-patient relationship	Question 1 Question 3
Perceived Ease of Use	Users were asked to rate how easy the EHR will be to use	Question 3
Perceived Usefulness	Users were asked to give their opinion about how useful the EHR will be to them and the health care system	Question 1 Question 2 Question 3 Question 4
Attitudes About EHR Usage	Users are asked to give their opinion about the EHR usage and acceptance	Question 2 Question 3 Question 4
General/Comments		Question 4

3.3.3 Step 3-Survey Design Strategy.

Since step three addresses the drafting and refining of the research instrument, the survey was brought together. An introduction was created and placed in the beginning of the survey, which included: information about the research objectives, primary investigator, anonymity of the survey, and the amount of time it would take to finish the survey. Furthermore, a small description of the upcoming category was added to introduce and

transition to each new section of the survey. The survey was built electronically and tested to ensure the participants could complete the survey without any barriers.

3.4 First Round of Surveys - Pre-intervention

After ethics approval was received from the University of Ontario Institute of Technology (Appendix C) and from the Ontario Shores Ethics Committee (Appendix D); an invitational letter was sent to all the unit managers, followed by a memo to all staff. The invitational letter and memo had the link to the online survey; and staff was given the option to get paper copies of the survey on request. In addition to the letter, an email was sent to all the staff with the memo attached and the link to the survey. A reminder was sent every three weeks for a period of two months. The invitational letter and memo can be found in Appendix E and F respectively. As the first survey was sent out, process modeling of all the units commenced using the PaJMa model.

3.5 Patient Journey Modeling

In order to complete the current and future state patient journey models, consent was obtained from the department heads to collect information through observations on the unit and interaction with staff. This was a continuation of work that was already being done at Ontario Shores by their informatics team for their project to implement an electronic health record.

A template of the PaJMa model was taken to the unit, which acted as a reminder to collect all the necessary information. As the process flows were being observed simple field notes were being taken to answer all the categories of the PaJMa model (i.e. role, process, communication mediums, technology use, policies and procedures and forms). To ensure that accurate information was being collected at times the nurses were

asked to clarify their task or identify the names of all the forms they were using. The notes were brought back and then used to build the models using Microsoft Visio.

Current and future state models representing technology use and process flows of all units at the centre for mental health sciences were created using the PaJMa model. All managers and staff were notified of this initiative and were aware that data was being collected to construct process models. The main areas that were mapped included: Special Services (three units), Assessment/Reintegration (four units), Forensics (seven units), Adolescents (two units) and Special Populations (one unit). The following processes were mapped for each of the units; admissions, allergy, referral, medication administration, ordering, leave of absence, and discharge. There were a total of seven maps created for each of the five areas for a total of 35. The initial maps of the first area took about two-three hours each to gather the data and an additional one-two hours each to build them in Visio. Once the maps were created for the first area they were used as the baseline to take to the other departments and collect the differences, as about 80% of the processes were similar. Using the created maps made the process much faster to create the maps for the subsequent areas.

Once the current state process models were developed for each area; the models were presented to the unit managers for a final sign off, to ensure that the captured processes were accurate. At times the managers would identify some discrepancies in the models or discover that certain items were omitted. All the changes were noted down and taken back to revise the models and they were brought back to the managers for final approval. There were about two-three

iterations required to revise the models and get final sign off. This process took about two months to complete the 35 current state models. Figure 4 below shows an example of a PaJMa model representing the medication ordering process for a psychiatrist.

Once the current state models were mapped, they were analyzed for inefficiencies. These inefficiencies included factors such as: duplication of data collected; un-necessary wait times for the patient; reliance on paper records; unorganized process flows and communication breakdown. These inefficiencies were found by analyzing all the levels of the PaJMa model (McGregor et al., 2008); a description of how the analysis was done for each level is shown below:

Patient Movement: The top layer of the model allows the visualization of patient involvement. Therefore, when the process flows do not show much patient involvement it was identified that time was being spent on administrative duties, and the patient was waiting for their next interaction with a clinician.

Staff Roles: The second layer of staff roles allows the visualization of the number of staff it requires to complete a process, and also to see the repeated involvement of the staff and the communication between them. If multiple staff were collecting the same information on different forms, it would be highlighted in this area.

Processes: This layer shows the action items that are taking place. Manual processes that could be automated by the electronic system were quickly identified and simply crossed out during the analysis. Furthermore, processes that were unorganized and redundant steps were also caught.

Information: This layer quickly highlights the paper vs. technology use in the process flows. During analysis of the different steps in the processes, the documents and forms used to collect data were compared, which allowed for any duplication to be found and addressed.

Practice Guidelines/Patient Needs/Policies: The final layer captured practice guidelines and the main shortfalls that come to light included: missing practice guidelines, out of date guidelines, duplicate policies, or user did not know where they existed.

Based on the inefficiencies that were found, the future state models were constructed. The future state models attempted to eliminate the inefficiencies and incorporated the new EHR system. Therefore, all the paper documents that were now going to be in the new EHR system were removed from the process maps and replaced with the EHR symbol.

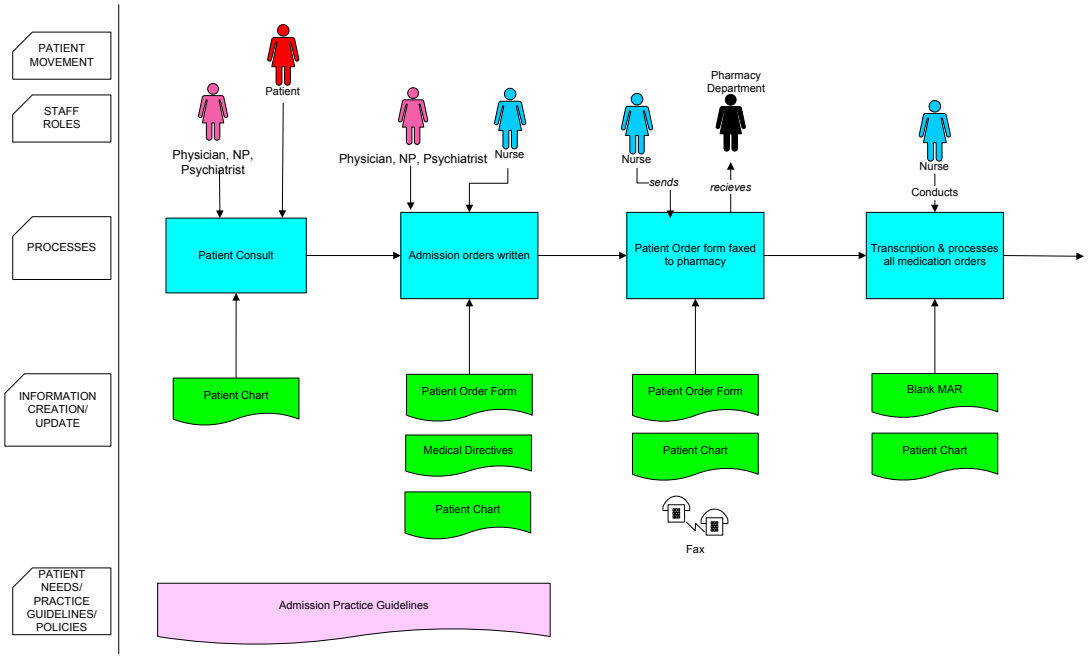

Figure 4. Medication ordering process for a psychiatrist.

3.5.1 Analysis of Attitudes & Intervention Creation

Once the first round of surveys had been completed the attitudes and opinions of all participants towards the EHR were analyzed. In order to complete the analysis the main areas of concerns were identified through qualitative measures and using grounded theory. The common concerns that surfaced from the first round of surveys provided the foundation and structure for the educational intervention, the analysis of the results can be found in section 5.1.

The educational intervention was created as a power point presentation, which highlighted the benefits of the EHR and was geared towards addressing any concerns, resistance, or fears that had precipitated from the round one survey analysis. The constructed process models were also used as an educational aid to represent the health professional's role in each process; and the future state models (which will include the EHR) represented how their role would change and become more improved and efficient in the future.

3.6 Educational Intervention

The intervention was delivered while the staff members were attending training sessions for the new EHR. The educational session was given prior to or after the training session; the presentation lasted about five minutes. A current process model was shown to the staff and the concurrent future state model of the same process was presented, by highlighting how the flow had improved and made their workflow more efficient. The presentation that was delivered remained consistent, the only alteration that was made was the type of PaJMa maps that were presented. The PaJMa maps were specific to the type of group that was attending the training. For example, the allied health group was shown a workflow of how their referrals are filled out on the unit (legible or not) and then

they are put in the office mail and delivered to the coordinator, who then sends it to the appropriate professional. The future state map eliminated all the transportation steps of the referral, as the referral would be entered into the EHR and instantly shows up on all the allied health professional's desktop where it can be picked up. This showed how time was going to be saved, referrals would be legible and patient care could be delivered faster.

3.7 Second round of Surveys-Post-intervention/Pre-implementation

Once the educational session was completed the participants were asked to complete the second round survey. The exact same survey was used from phase one with some category questions omitted which included: management support, user involvement during the implementation, and adequate training. The reason for the omission was to have the survey more focused on capturing the attitudes of the clinicians towards the EHR, and to assess if they understood the benefits of it. This also made the survey much shorter and also catered to the few complaints that were received about the length of the survey from round one participant.

The second round of surveys served as a tool to evaluate the effects of the intervention on the attitudes and opinions of the health care professionals. A quantitative statistical analysis of the survey results was compiled to assess if the intervention had positive effects on the attitudes towards EHRs. All second round surveys were available for two months for the users to complete.

Once the results were tabulated they were compared with the first round survey results to assess the impact of the educational intervention. The purpose was to

determine if the educational intervention addressed the users' concerns (from round one), and if the attitudes of the participants became more positive.

3.8 Third Round of Surveys – Post-implementation

The third round survey was delivered within three to six months post implementation of the EHR to assess the changes in the healthcare professional's attitudes, if any. The exact same survey was used from round one with some questions from the general questions category omitted. Furthermore, the tense of the questions was changed, as in round one and two the questions were in the future tense and in round three the questions were in present and past tense.

Conducting this follow up survey was important to capture how the attitudes of the end users may have changed; as in the initial surveys the participants were building their knowledge of the EHR and perceiving the system to be useful or not. Having hands on experience allows them to learn about the reality of working with an EHR and formulate their opinions on its usefulness.

A memo was sent to all staff notifying them about the final survey and asking them to complete it. A reminder was sent every three weeks for two months and the participants were given up to two months to complete the survey after the last reminder. Once the third round of surveys was completed a quantitative statistical analysis of the survey responses was performed. The narrative responses were analyzed with the use of the grounded theory and themes were identified.

Chapter 4 - Results & Discussion

4.1 Pre-Intervention Findings.

Phase One surveys were distributed to the staff of the organization prior to them receiving any educational intervention or training. The purpose of this survey was to capture their attitudes toward the upcoming EHR and use the results obtained to set a baseline for comfort, and expectations. Detailed results for all phases can be found in Appendix H.

In round one there were a total of 140 participants, out of a possible 812 healthcare workers, who completed the survey on paper or online. Two-thirds of the participants enrolled worked primarily in the inpatient setting; this is important as the focus of the implementation is mainly on the inpatient setting as the outpatient was being implemented in full at a later time. In round one 17% of the total sample size enrolled in the study.

4.1.1 Demographics.

The participants were mostly females which made up 69%; 21% were males and 11% provided no answer. The high percentage of females is an accurate representation of the staff at the organization. The age of the participants was fairly distributed with the highest enrollment between the ages of 30-39 years at 33%. As the age increased the number of participants in those age groups declined, shown in Figure 5.

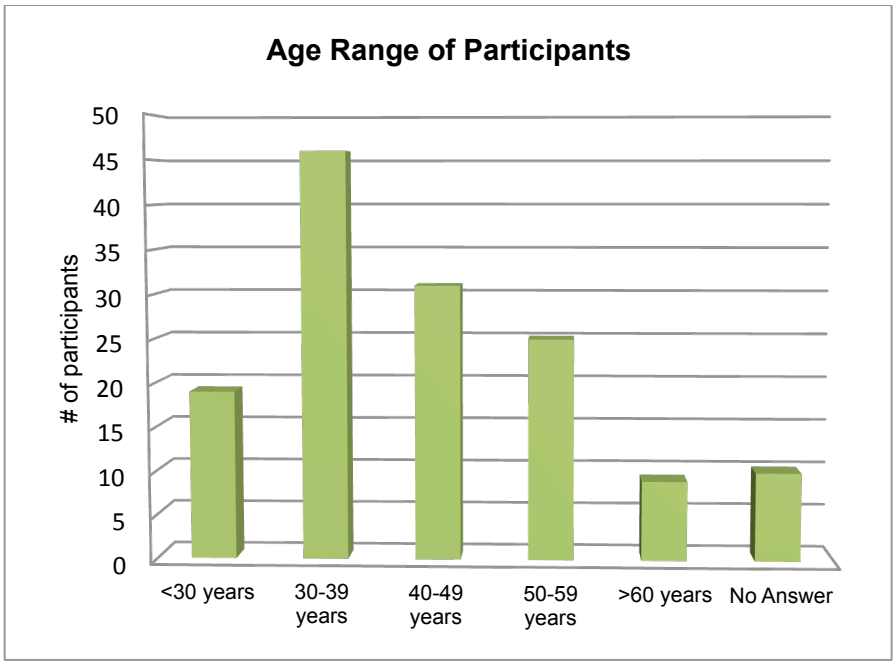

Figure 5. Age Range of the participants in rounds one.

Among the 140 participants it was found that allied health (i.e. physiotherapists, social workers, dieticians etc.) had the highest response of at 41%, nurses made up 36%, physicians 13%, and 10% made up the others category (i.e. clerical, management etc.) and individuals who did not answer, shown in Figure 6 below. Although the distribution of participants is fairly representative of the facility, nurses make up most of the population and not allied health. But it is important to note that there is a strong presence of allied health workers. In reviewing past literature the focus has been found to be on nurses and physicians and the allied health group has not been highlighted. These results are showing that the allied health professionals play an important role in the patient's care and will be using the EHR; therefore they should be incorporated in the change management plans of the organization.

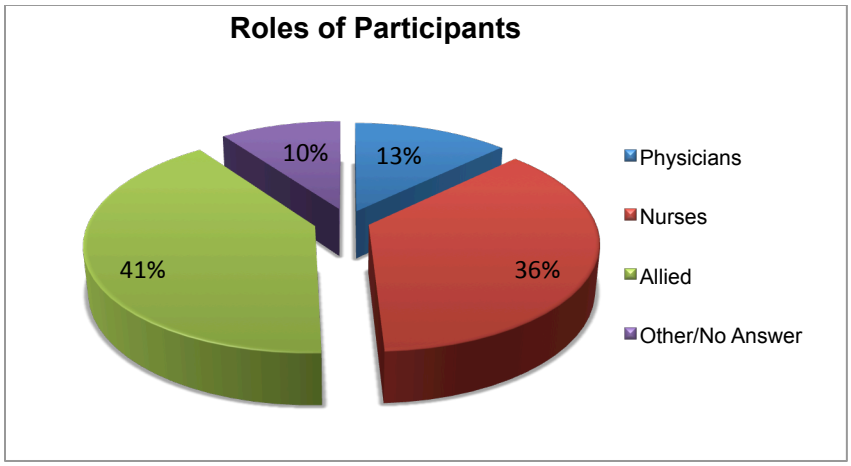

Figure 6. Role of Participants in round one.

4.1.2 Computer Usage Background.

Half the participants have had some type of formal training on computer usage; they have either taken a course in school or some type of workshop or training in computers. Whereas the other half (47%) of respondents learned computers through self-guided learning, leaving only 3% of participants who have had no training or experience with computers in the past.

Furthermore, the frequency of computer usage among 77% of the respondents was fairly high at more than 11 times a week. It was identified that the respondents were using computers or other handheld devices to access patient information, their email, and the Internet and health journals. Table 3 shows the details of their computer usage breakdown, the respondents were allowed to select more than one response. It can be assumed that since there is relatively good comfort level with computer usage, the user acceptance of the EHR should be positive. This has been shown in a study conducted by Wilkins in 2009, where she concluded that users were willing to use and learn the new EHR perhaps because they were comfortable with the use of computers in general.

Table 3

Computer Usage of Participants from Round One Surveys

Type of computer usage	# Of participants	Percentage of participants
Patient's medical information (a)	84	60%
Your email/internet (b)	129	92%
Health/clinical resources, journals and/or research (c)	101	72%
Other (look at next sheet)	13	9%

In additional to data collected on the participant's computer usage patterns their skill level of computers was also obtained. The skill level of 40% of the participants was between Novice and Basic general skills and 54% were at an Expert level (Table 4). We can assume that most of the participants are fairly familiar and comfortable using the computer and this may aid in the EHR acceptance. A study by van der Meijden, Tange, Troost, & Hasman in 2001 found that users with previous experience with computers had a more positive attitude toward the EHR and were willing to accept it.

Table 4

Computer Skillsets of Participants from Round One Surveys

Skills	# Of Responses	Percentage
Novice - beginner with limited skills; requires assistance with email and/or Literature searches	6	4%
Basic general skills - advanced beginner; able to use basic functions of email and word processor and perform literature searches	50	36%
Advanced general skills - starting to become well-rounded, knowledgeable, can perform more advanced literature searches, create PowerPoint presentations, and use spreadsheets	76	54%
Expert - formal training in computers with ability to program in some languages	4	3%
No answer	4	3%

4.1.3 Management Support.

The data captured shows over 80% of the respondents felt that the EHR project is important to top management and that they are expected to use the EHR. In terms of how management will be implementing the system, over 60% of the respondents agreed or strongly agreed that management will do an effective job in implementing the EHR and that they will be involved in the process. Furthermore, participants were very positive (over 70%) on how they perceived their management would be providing them with effective training and access to resources that will help them understand the EHR.

These results are suggesting a strong relationship between staff and management, as well as confidence in management's plan and strategy for the EHR implementation. Furthermore, literature supports that if top management is engaged in the implementation, training and support of the end user this has a direct positive effect on user satisfaction. Users tend to embrace the technology and have a smoother transition period (Klein & Knight, 2005; Wilkins, 2009; Bradford & Florin, 2003).

4.1.4 End-User Involvement During Implementation.

In this section in the survey asked the participants to rate their expectation of involvement during the implementation phase of the EHR project. A series of questions related to end-user involvement during the implementation of the EHR yielded highly positive results; showing that end users agree or feel strongly about being involved in order to increase their knowledge (81%), make the EHR more useful (76%), and easier to use (82%). Over 74% felt that their involvement during the implementation of the EHR was a "must". From an overall perspective, when the users were asked if their attitude would be positively affected if they were involved in the implementation, 69% either agreed or strongly agreed. Past studies have shown that in order to increase the usability of the

system the involvement of the end user is vital (van der Meijden et al., 2001). Since the results in this survey are showing a high percentage of users who feel they should be involved, it can be assumed that the participants are willing to change and accept the new technology (Jarrar et al., 2000).

4.1.5 Adequate Training.

This section of the survey participants rated their expectation about the training they would receive on how to use the EHR. Questions relating to training showed some fairly positive results but also a little uncertainty among the respondents. Table 5 below shows the opinions of the respondents in regards to if they would receive adequate and sufficient training in order to understand and use the EHR. For both areas over half of the respondents agreed and strongly agreed, over 40% had no opinion and about 5% disagreed or strongly disagreed.

Table 5

Participants' Opinions on Training from Round One Surveys

Adequate Training Questions	Likert Scale	# Of Responses	Percentage
The training I will receive on the EHR will be adequate	Strongly Disagree	2	1%
	Disagree	5	4%
	Neither Agree/Disagree	26	19%
	Agree	57	41%
	Strongly Agree	16	11%
	Don't Know	13	9%
	No answer	21	15%
I will receive sufficient training in order to understand and use the EHR	Strongly Disagree	2	1%
	Disagree	4	3%
	Neither Agree/Disagree	22	16%
	Agree	61	44%
	Strongly Agree	16	11%
	Don't Know	14	10%
	No answer	21	15%

Furthermore, the participants were asked to give their opinion on whether they feel the training they receive would make the EHR easier to use and more useful to them. The responses received for both areas were identical where over 70% of the users either agreed or strongly agreed, 27% had no opinion, and only 3% disagreed or strongly disagreed. Furthermore, when asked if EHR training is essential for all staff, the participants had the same opinions with 70% of them agreeing or strongly agreeing and 30% had no opinion. Literature supports that the training that end users receive has a direct effect on user satisfaction (Bradford & Florin, 2003; Klein & Knight, 2005). Based on the results obtained in the round one survey it can be predicted that the user satisfaction will be high post-implementation.

4.1.6 User Autonomy.

There were varying response seen among the respondents regarding the future role of the EHR and the control it may or may not have over their clinical workflow. When asked if the EHR will increase the hospital administration's ability to control and monitor their clinical practice and decision-making, 35% of the participants agreed while 19% strongly agreed. Only 7% disagreed or strongly disagreed that the EHR would enable increased monitoring. These responses showcase that the clinical healthcare workers may be experiencing some anxiety in regards to how their workflows may be changing in the future. On the other hand, when the respondents were asked if they feel that their attitudes about using the EHR will be negatively affected as a result of the increased control and monitoring of their clinical practices and decision making; the results found that 43% disagreed or strongly disagreed. This implies that they are not overly worried about management being able to control or monitor their workflow or they may trust management to use the control wisely.

The opinions of the participants toward the EHRs' potential to threaten their personal and professional privacy; and whether the EHR will create legal or ethical problems for them were also obtained. The responses obtained from both areas were fairly similar as about 46% disagreed or strongly disagreed, about 10% agreed or strongly agreed, and 44% had no opinion. Since there were almost half of the participants who disagreed with these statements hence showing a positive attitude towards the EHR, it can be assumed that the respondents have confidence in the upcoming EHR and do not feel threatened by it.

These results may act as additional evidence that may possibly aid in user acceptance. The high percentage of respondents with no opinion could imply that they do

not have enough information to understand what type of legal and ethical problems could arise and hence did not give an opinion.

4.1.7 Worker-Patient Relationship.

The data collected on the attitudes of clinicians towards the effect of the EHR on three areas of their relationship with the patient shows that on average, 48% of the participants feel that the EHR will not negatively affect their relationship. They feel that 1) their credibility will not be threatened, 2) their patient's confidence will not diminish and 3) there will likely not be a reduction in the patient's satisfaction with the quality of health care she/he receives.

On the other hand there is a high percentage (44%) of individuals who are unsure or do not have a strong opinion. This could be a result of lack of knowledge about the role of the EHR will play in their workplace. This is good evidence that the individuals need to be educated regarding EHRs and their clinical integration. Therefore, there is support that this topic should be incorporated during the educational intervention.

4.1.8 Ease of Use.

The opinions captured regarding the ease of use are fairly positive among almost half of the participants. 41% of the participants either agreed or strongly agreed that 1) their interaction with the EHR would be clear, understandable and user friendly; and that 2) learning to use the EHR would be easy for them. There were about 49% of respondents who had no opinion, didn't know or did not respond to these questions. Since there are a high number of participants with no significant opinion this signifies that they may not be aware of the capabilities of the EHR or may not have the background or knowledge to create a strong opinion.

On the other hand, although some respondents may not have all the required knowledge, when asked if they would like to- or expect to become skilled at using the EHR, on average 66% agreed or strongly agreed. Of these respondents, 29% of the population strongly agreed, hence showing a desire to become skilled. These results demonstrate that the participants are keen to learn about the new EHR and become more informed.

4.1.9 Perceived Usefulness.

The participants were asked to rate their opinion on perceived usefulness, so that their views can be understood on how the EHR will benefit their daily processes and improve patient care. When the participants were asked if the EHR would allow them to provide better patient care and improve patient safety, there were mixed responses, 37% of the respondents agreed or strongly agreed that the EHR will improve the quality of their work in providing better patient care. From the remaining participants greater than 50% of the respondents did not have an opinion, did not know or did not respond to the question, results shown in below in Figure 7. The high percentage of users who did not have an opinion could be due to their lack of knowledge regarding the EHRs and therefore did not know how to address these questions.

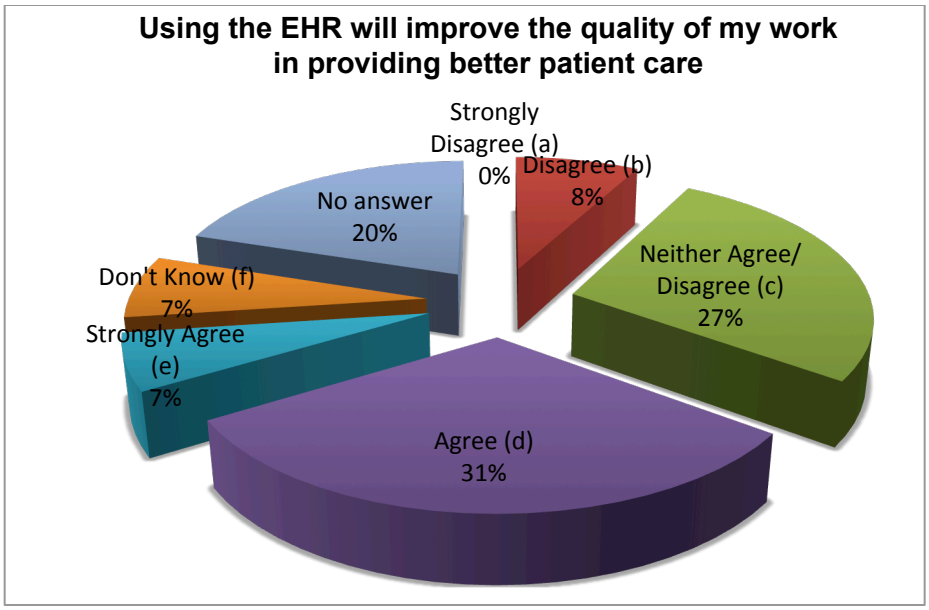

Figure 7. Participants' responses on if the EHR improves quality of clinical work

When the participants were asked if they feel that the EHR will improve patient safety 41% agreed or strongly agreed and 53% did not have a strong opinion or did not provide an answer, breakdown of results shown below in Figure 8. A breakdown of these responses has also been shown by role in Table 6 below. The lack of responses obtained could be due to the absence of knowledge regarding the literature (Grissinger & Globus, 2004; Furukawa et al., 2008; Menachemi et al., 2007) that supports that EHRs improve patient safety. This is an important subject that needs to be highlighted in the educational interventions.

Table 6

Participants' Attitudes on if the EHR Improves Patient Safety from Round One Surveys

EHR improves patient safety	Allied	Nurse	Other	Physician
Strongly Agree/Agree	42%	37%	31%	61%
Neither Agree or Disagree	18%	27%	0%	28%
Strongly Disagree/Disagree	2%	8%	6%	11%
Don't Know/No Answer	38%	27%	63%	0%

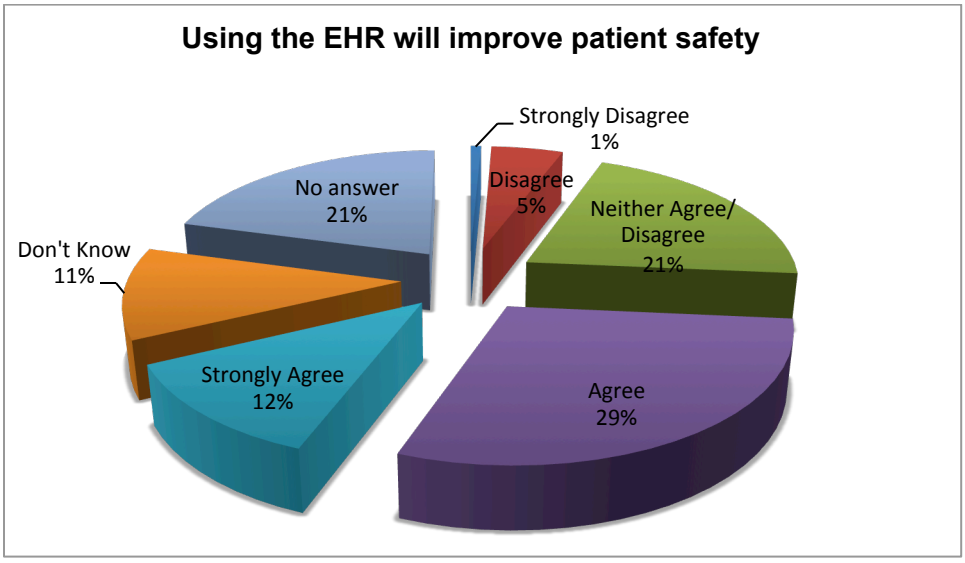

Figure 8. Participants' responses on if the EHR will improve patient safety.

Furthermore, 59% of the respondents agreed or strongly agreed that the EHR will improve communication between clinicians. The participants were not confident that the EHR would allow them to accomplish a greater number of tasks and more quickly than before the EHR. These results could imply that some participants feel that the EHR may slow their daily processes down since now they will have an additional tool they may have to use. Also, these results may imply that the participants may not be aware of all the benefits the EHR can provide to them and their patients; therefore this is another element that should be addressed in the training and educational sessions.

4.1.10 Attitudes on EHR Usage.

Some interesting responses were received when asked if the participants will encourage the use of the EHR among their colleagues. Although there were 56% of participants who agreed and strongly agreed, there were still 41% of participants who had no opinion,

did not answer or didn't know; this could be a sign of resistance to change or uncertainty of not knowing how their role may change.

Questions that asked if the EHR will support clinicians to provide better patient care and if the EHR is required to provide effective patient care had an average of 35% of participants who agreed. Having a low percentage of participants who agree may imply that the clinicians of the organization are not aware of the benefits of an EHR and how it can aid in improving patient care. On the other hand the participants may feel that the EHR may take them away from the bedside and decrease patient interactions.

Additionally, only 38% of the participants felt that they are not satisfied with using the paper-based patient record at their job with an additional 46% that did not have an opinion or did not answer. Literature has highlighted that the main weaknesses of paper based patient records include: inaccessibility, incompleteness, illegible and poorly organized. Hence, moving to EHR would resolve all these weaknesses (van der Meijden et al., 2001). On the other hand, almost half of the participants agreed that health records would become more easily accessible with the new EHR. Since there are a high number of participants who do not have an opinion, this could imply many things such as resistance or they lack the knowledge of the benefits of the EHR. A breakdown of these results is shown in Figure 9.

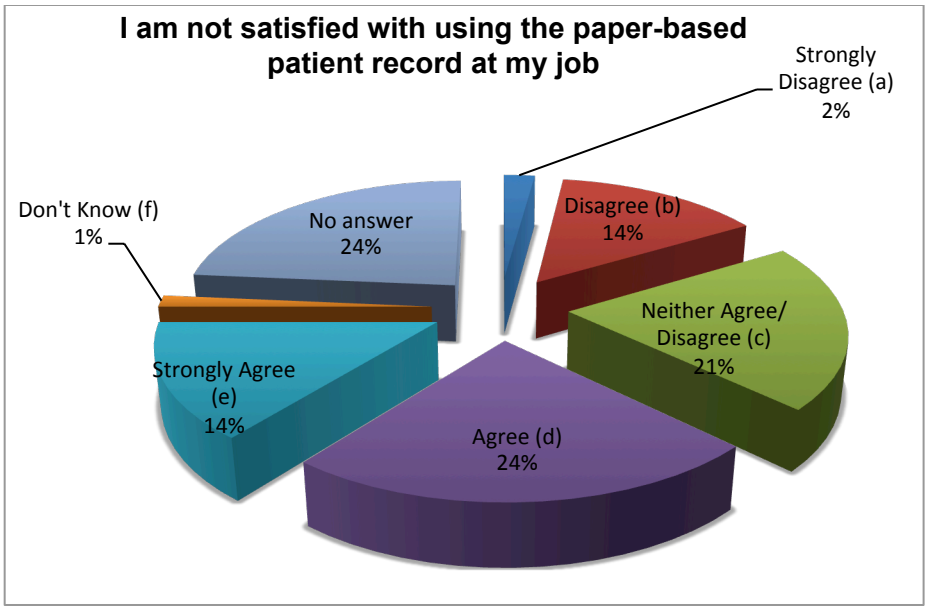

Figure 9. Responses received from participants regarding their satisfaction with using paper-based records at their job.

There were a high percentage (65%) of participants who felt that learning the EHR is important for all staff; it can be assumed that most respondents are willing to learn and accept the new technology in their practice. Furthermore, 58% of the participants also feel that their attitudes toward EHR usage will be or are positive with only three participants disagreeing.

4.1.11 General Questions.

This section of the survey was intended to capture some general information about the participants' overall views.

Mobile Technology and Access. A series of questions were asked about 1) how important it was for the participants to access the EHR off-site or from home; 2) how useful would mobile technology, or 3) tablets be to enter EHR information at the patient's bedside. Lastly, 4) how useful would mobile technology be to communicate with other care providers.

From the total population there were about 30% of participants who did not have any opinion on these four areas. Table 6 below, a breakdown of the responses received by role is shown. Each percentage has been derived from the total number of participants in that role, and not from the total population.

Greater than 50% of allied health participants felt that having a tablet or mobile technology to enter or access EHR information would be useful; and greater than 60% felt that having access off-site and having mobile technology to communicate with other providers would be useful. Furthermore, over 50% of nurses felt that all four areas would be useful to them. It is interesting to see that 55% of the nurses felt that having access to the EHR off-site would be useful; due to the fact that they are usually doing shift work and it would be unusual for them to access information off-site after work.

Whereas physicians who are often moving from one unit to another or from one hospital to another, having access off-site would work well with their workflow. This is supported by the results obtained where 67% of the total physicians feel it would be useful. About 50% of the physicians felt having a tablet computer or mobile technology would be useful. Lastly, 47% of the physicians felt that having mobile technology to communicate with other providers would be useful.

Table 7

Participants' Responses by Role Regarding Mobile Technology and Access from Round One Surveys

Mobile Technology & Access	Allied		Nurses		Other		Physicians		No Opinion
	Useful	Not Useful	Useful	Not Useful	Useful	Not Useful	Useful	Not Useful	
1) Access the EHR off-site or from home	62%	38%	55%	45%	33%	67%	67%	33%	30%
2) Using mobile technology to enter/access EHR information	54%	46%	51%	49%	33%	67%	53%	47%	30%
3) Using tablet computers available to enter/access EHR information at the patient's bedside	55%	45%	51%	49%	33%	67%	47%	53%	31%
4) Using mobile technology to communicate with other care providers	64%	36%	57%	43%	0%	100%	47%	53%	33%

Training. The results captured show that 43% of the participants prefer to be trained in a group setting, 24% prefer one on one tutorial, 28% prefer online or self-guided tutorials and 6% prefer other methods. The other responses had a total of 9 responses in which 56% stated that they would like practice sessions. Additionally, the participants were given the option to leave suggestions on how management should organize the training. A few themes can be determined from these responses, from the 33 responses received the common themes included were: hands on practice, have small group sessions, group same professions together, and allow more time to people who require it (i.e. drop in sessions/support). Below are a few of the suggestions from the participants.

"Extra sessions for people who feel they are struggling" -*Nurse*

"Group professions together (i.e. nursing together, managers as another group) as their questions will be similar and they will learn from each other" -*Nurse*

"VERY small group settings (4-5 people)" –*Nurse*

"Hands-on practice and clinical scenarios" –*Allied Health*."

Managements' Role. The participants were also asked to share their opinions regarding the role they feel management (including physician leadership) plays in the EHR. There were a total of 39 comments. A few themes were noted from these responses: management support; importance of motivation; management and physicians should be knowledgeable about the system; EHR usage and acceptance is vital for the physician group to avoid negative impact on other disciplines; and additional refresher courses. Representative participant responses are shown below:

"Buy-in and share enthusiasm. They are leaders here and others look to them to set the tone."

–*Allied Health*

"Physicians will need to be on top of their work, i.e. med orders so everyone else can do their work." -*Nurse*

"Allow attendance at refresher courses, and ongoing education and support" –*Allied Health*

"They play a big role as physicians need to do electronic order entry. As some physicians are not pleased with the new system, there may be some 'blanks' or inconsistencies in patient info." –*Allied Health*

"They are the leaders and should encourage this. They should also speak positively to motivate staff. They need to lead by example." –*Allied Health*

Attitudes toward EHR adoption. Almost 70% of the participants responded "Don't Know" or provided no answer when asked if they feel that the healthcare workers and executives at their organization were in consensus regarding their attitudes towards EHR adoption. This implies that the organization may not have communicated the upcoming changes to their staff well. Therefore, since the staff is unaware of the changes they are

not discussing it amongst themselves and hence do not know the overall attitudes of their colleagues or of management. The data can also support that there may be some resistance to change and hence many participants did not even respond to these questions. Studies have shown that effective communication to let staff know of the upcoming changes is very important, as it will generate trust and build an atmosphere for change and discussion. Furthermore, the same studies have shown that in order to reduce the resistance to change, support and involvement of top management is critical (Jarrar et al. 2000).

General Opinions. Near the end of the survey the participants were asked if there was any process that they would like to see automated which would aid in making their process flows more efficient or increase patients' quality of care. Almost 13% of the participants responded with comments. Most responses were specific to certain process flows of documentation or connecting to community health care providers. The participants may see a benefit of connecting to external providers for the reason of easily accessibility and sharing of records seamlessly.

There was an interesting response, which can be seen below, that stated that the EHR would take time away from the bedside. In analyzing this response it is clear that this respondent feels that the EHR will be taking away time from the patient, as they will need to sit in front of a computer. Furthermore, they may be feeling that the upcoming change is only focusing on technology and not patient care. This type of response can be due to the fact that the mental health work environment is a little different than acute care, as it requires the nurses to spend extra time with the patient in the form of counseling to improve mental health, and not just focusing on physical assessments.

Hence, the nurse feels that his/her time for patient interaction will be reduced due to the new system requirements. It can be assumed that management has not communicated the benefits of the EHR in relation to patient care to the end users. Therefore the respondent is unaware of why the change is occurring and therefore exhibiting resistance to it.

Literature supports that if there is open communication by top management to end users about the change that is coming, it will help the users to become acquainted with the new situation and understand it (Jarrar et al., 2000).

> "No. Too much time in front of a computer. There's something to be said about having time to sit with a patient and just speak. They have all identified it as the top form of treatment, and yet we seem to downplay this aspect...We need to be spending more time speaking with clients. That is where "quality" mental status exams take place. This is where you can really determine probabilities around risk, etc."
>
> *–Allied Health*

4.2 Pre-Intervention Findings Summary.

In reviewing the round one results overall it was found that the population had a good comfort level with computers; they also had faith and high expectations of their management to provide great support. They felt they should be involved in the implementation process and they understood that training was required.

These preliminary results provided a picture of the current atmosphere in the organization and a baseline was set for comfort and expectations of participants. The general attitudes of the staff were obtained and analyzed to find the gaps in knowledge. The gaps in knowledge among the participants were found primarily around the following areas: how their role will change with the EHR; the effects the EHR will have on their relationship with patients; how the EHR can improve patient care, patient safety and workflows; and why the EHR is better than paper records.

This information obtained from the results was the foundation for what the educational intervention included. These concerns and uncertainties seen in the results provided the basis of the content that was added to the educational sessions to highlight the benefits of the EHR.

4.3 Post-Intervention/Pre-Implementation Findings.

Round two survey results were obtained after the participants attended an educational session on the benefits of EHRs. The exact same survey was used from round one with some questions omitted as the survey was more focused on capturing the attitudes of the clinicians towards the EHR and assessing if they understood the benefits of it. Questions from the following categories were omitted: management support, your involvement during the implementation phase and adequate training. This also made the survey much shorter and also catered to the few complaints that were received about the length of the survey from round one participants.

In round two there were a total of 36 participants, out of a possible 821 healthcare workers, who completed the survey on paper or online. 85% of the participants enrolled worked primarily in the inpatient setting. Round two makes up about 26% of the total sample size enrolled in round one.

4.3.1 Demographics.

The participants were mostly females which made up 70%, 22% were males and 8% provided no answer, the female to male ratio was almost identical to round one. The highest enrollment was seen of participants between the ages of 50-59 years at 33%.

Among the 36 respondents it was found that nurses had the highest response rate at 53% with 19 participants, there were 10 allied health participants, 6 physicians and 1

diagnostic imaging technician, shown in Figure 10 below. This is representative of the organization's staff distribution as nurses' makeup over 50% of the population.

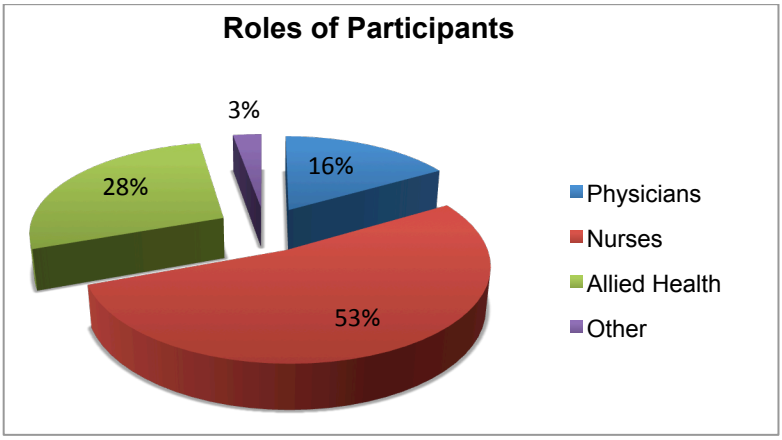

Figure 10. Roles of participants in round two.

4.3.2 Computer Usage Background.

In the pool of participants for round two there was a high percentage (67%) who had never used an EHR in another facility and only 14% had some sort of past experience. Since there are a high percentage of respondents who have never used an EHR it can be assumed that the educational session presented them with new information, and hopefully increased their knowledge around EHRs.

Furthermore, in regards to computer skills 61% of participants displayed "Novice" to Basic general skills and 39% had "Advanced" to "Expert" skills. There was a 20% increase in the percentage of participants who have "Novice" to "Basic" computer skills since phase one. We can assume that most of the participants are familiar using the computer for basic tasks.

4.3.3 User Autonomy.

There were varying responses seen among the respondents regarding the future role of the EHR and the control it may or may not have over their clinical workflow. When asked if the EHR will increase the hospital administration's ability to control and monitor

their clinical practice and decision making, 39% of the participants agreed and 6% strongly agreed; whereas in round one, 35% agreed and 19% of participants who strongly agreed, shown in Figure 11. A decline of 13% in the percentage of participants who strongly disagree was shown in the captured data. This percentage decline of respondents, who had a strong opinion about their clinical practice being monitored, may be due various factors. One factor could be that although there is some anxiety towards the upcoming change, by learning more about the benefits of the EHR they are starting to understand that the benefits out-weigh the cons.

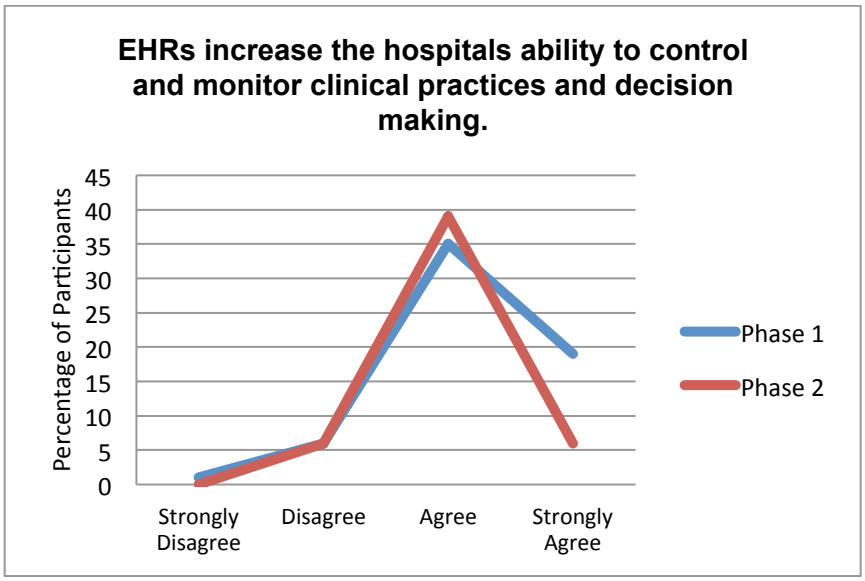

Figure 11. Participants' opinions on the EHR's monitoring capability.

On the other hand when the respondents were asked if they feel that their attitudes about using the EHR will be negatively affected as a result of the increased control and monitoring of their clinical practices and decision making; the results found that 42% disagreed and strongly disagreed which is similar to the results obtained from round one and 19% agreed or strongly agreed. Once again, it can be assumed that the educational session gave the participants knowledge and understanding about the benefits the EHR

will bring to patients, and therefore they have given more weight to that instead of the monitoring capabilities of the system.

The responses of the participants towards the EHR's potential to threaten 1) their personal and professional privacy and 2) create legal or ethical problems were shown to be positive towards the EHR as an average of 39% disagreed and strongly disagreed. There was an average of 18% of the participants who agreed and strongly agreed; it can still be assumed that this data represents that more than one-third of the respondents have confidence in the upcoming EHR and do not feel threatened by it. On the other hand, there has been an increase in the percentage of participants from round one who feel that the EHR may create legal or ethical problems for them. This could be due to the fact that now the EHR will record which user is doing which activity and there will be audit trails of the activity, which they learned during training.

This data was consistent with the findings in round one when the participants were asked their overall opinion on their attitudes about using the EHR may be negatively affected as a result of the security, legal and/or ethical concerns associated with using the EHR. There were 16% of participants who agreed and strongly agreed and 44% that disagreed and strongly disagreed. The major change that was noted was a decline in the percentage of no responses, in round one 19% of the participants did not respond and in round two it was only 6%. These participants seemed to be relocated mostly to the Neither Agree/Disagree category, which increased, from 22% in round one to 31% in round two. The data is showing that maybe due to the educational intervention the participants are thinking about these issues and have a little more knowledge and understanding allowing them to form an opinion to these questions.

4.3.4 Worker-Patient Relationship.

The data collected on the attitudes of clinicians towards the effect of the EHR on their relationship with the patient; shows that over half of the participants feel that the EHR will not negatively affect their relationship. They feel that 1) their credibility will not be threatened (53%); 2) their patient's confidence will not diminish (58%); and 3) there will likely not be a reduction in the patient's satisfaction with the quality of health care she/he receives (61%). On the other hand the percentage of participants who agree or strongly agree doubled from round one in these three areas. A study conducted by Kossman & Scheidenhelm found that nurses felt they spent a lot of time on the computer but they also felt that the EHR aided them in providing safer care but a lower quality of care (2008).

Furthermore, the nurses in this study also preferred the EHR to paper records and understood the benefits outweigh the negatives (Kossman & Scheidenhelm, 2008). Although the educational intervention did not focus on these areas specifically from round one there was a decrease of an average of 17% in the percentage of participants who selected don't know or did not answer. This is good evidence that the education session may have increased the participants' knowledge and allowed them to start formulating opinions.

4.3.5 Ease of Use.

The opinions of the respondents regarding the ease of use are fairly positive among almost half of the participants. Almost 50% of the participants either agreed or strongly agreed that 1) their interaction with the EHR will be clear, understandable and user friendly; and that 2) learning to use the EHR will be easy for them. There was a decrease in the number of participants who had no opinion, didn't know or did not respond to these questions from round one showing that their knowledge of EHRs has increased as

they are formulating opinions. Alternatively, the percentage of participants who felt that the EHR will not be user friendly increased from 10% in round one to 19% in round two; furthermore the participants who felt the EHR will not be easy to learn increased from 11% in round one to 35% in round two. These results can correlate with the overall experience of this sample for round two; as there are a high percentage (67%) of participants who had no previous experience with EHRs, as noted above in section 4.3.2. This can imply that there is some anxiety towards learning the new EHR. Furthermore, the participants may be getting nervous learning a new computer system because now they are being more exposed to the upcoming changes. Since the EHR is brand new for 67% of these participants, this group of healthcare practitioners may need additional training to help remove anxiety about the new system and prepare them for the implementation.

Additionally, when asked if the participants would like to- or expect to- become skilled at using on average 72% agreed or strongly agreed. The data supports that the participants are keen on learning the new EHR and are exhibiting intentions to use the system as they are becoming more informed. Past research supports that if users show intentions of use, this factor is a good indication of increased system use and lower resistance (Hartwick & Barki, 1994; Legris et al., 2003).

Moving forward, there was a decline in the participants who expect to become skilled at the EHR from 70% in round one to 61% in round two. This can relate back to the participants' background in EHRs, since experience is low they may not have the confidence that they will be able to learn the EHR effectively even though they are willing to.

4.3.6 Perceived Usefulness.

When the participants were asked if the EHR will allow them to provide better patient care, there was a significant increase in percentage of participants who agreed or strongly agreed from 38% in round one to 56% in round two (shown in Figure 12). This increase may be due to the educational intervention that displayed the PaJMa models that represented their workflow and highlighted how the EHR can increase patient safety; which allowed the participants to develop stronger opinions. Other data that shows a decrease of 19% in the following responses: "don't know" and "no answer" also may support the increase in knowledge of the participants. Literature highlights that if the end users can perceive a use for the system and how it would be beneficial in their daily workflow, it is a strong predictor for future system use and acceptance (Morton & Wiedenbeck, 2009; Legris et al., 2003).

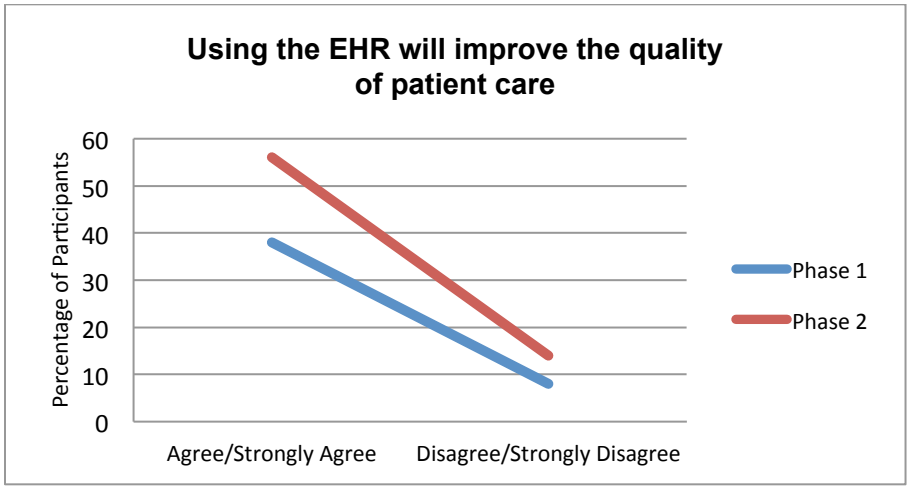

Figure 12. Participants' responses on if the EHR will improve the quality of their work and patient care.

Sixty-Seven percent of the participants feel that the EHR will improve patient safety, which is a significant difference from round one of only 41%. Furthermore, less than 30% of respondents did not have a strong opinion or did not provide an answer

whereas it was 50% in round one. This can suggest that the education interventions are providing substantial information to the participants. A breakdown of results on the responses of the participants towards the capability of the EHR improving patient safety is shown below in Figure 13.

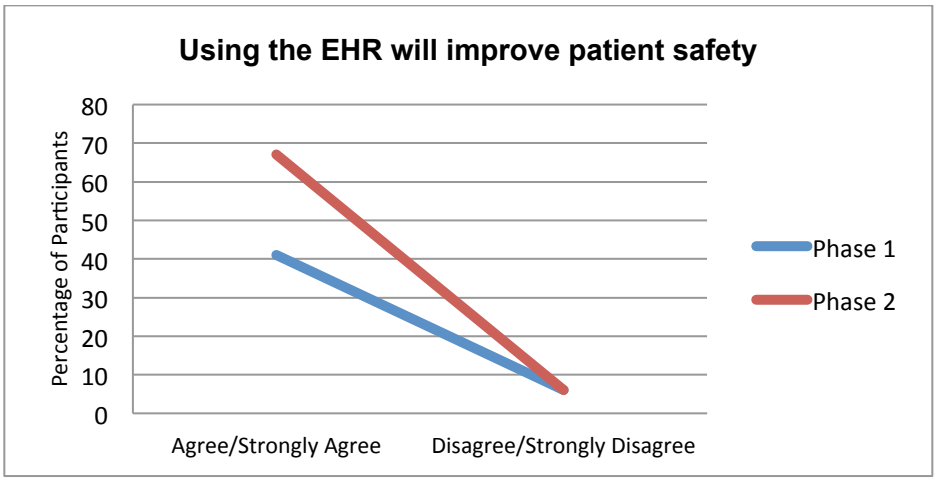

Figure 13. Comparison of round one and round two responses from participants on if the EHR will improve patient safety.

Furthermore, 75% of the respondents agreed or strongly agreed that the EHR will improve communication between clinicians, whereas only 59% agreed in round one. The participants' attitudes changed in regards to the EHR allowing them to accomplish tasks more quickly than before the EHR from 31% in phase one to 50% in phase two.

Additionally, an increase of 15-25% was seen among respondents who agreed that the EHR will enhance their overall effectiveness in their job and it would make their job easier to perform. This increase in positive attitudes towards the benefits of the EHR can support the use of educational interventions to promote and inform users. Furthermore, according to literature this data is evidence and a predictor of increased system use and acceptance in the future (Legris et al., 2003; Hartwick & Barki, 1994).

4.3.7 Attitudes on EHR Usage.

In phase two within this section of the survey all the data obtained displayed an increase in the percentage of participants who agreed or strongly agreed and a decrease in the lack of responses received. The responses are highlighting that the EHR will and is required to support in providing better patient care and two-thirds of the participants will encourage the use of the EHR among their colleagues. When asked about whether their overall attitude about the EHR usage is or will be positive; 75% agreed and strongly agreed, where as in phase one it was 58%.

Additionally, only 38% of the participants feel that they are not satisfied with using the paper-based patient record at their job this did not change from round one. On the other hand 89% of the participants agreed that comprehensive health records would become more easily accessible with the new EHR; this is a significant increase from phase one where only 46% agreed, a breakdown of these results is shown in Figure 14.

This data is implying that the participants are starting to understand their role and the role that the EHR will play in their daily workflow with patient care. This will also support end-user acceptance and less resistance to change (Jarrar et al., 2000; Legris et al., 2003; Adler, 2007).

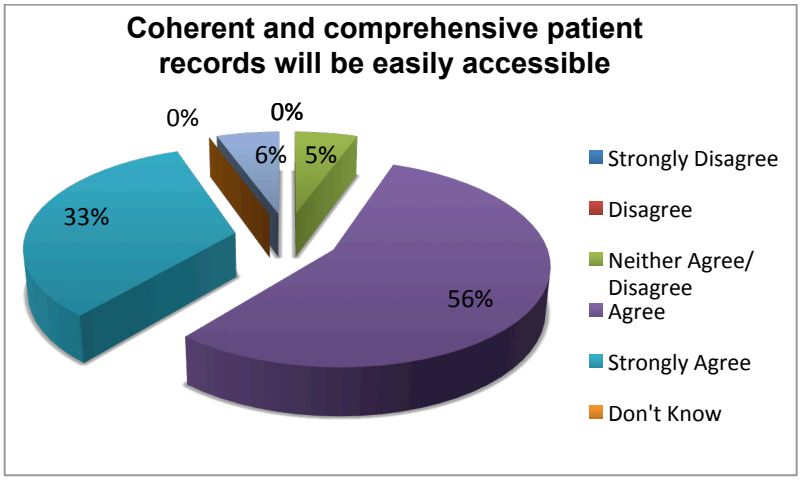

Figure 14. Participants' responses on easily accessible patient records from round two surveys.

4.3.8 General Questions.

Mobile Technology and Access. A series of questions were asked about 1) how important it was for the participants to access the EHR off-site or from home; 2) how useful would mobile technology; or 3) tablets be to enter EHR information at the patient bedside. Lastly, 4) how useful would mobile technology be to communicate with other care providers.

A series of questions were asked about how useful mobile technology would be to enter/access EHR information or communicate with other care providers. A 33% increase from phase one was seen in participants who feel having a tablet to enter/access patient information at the patient bedside would be somewhat- to extremely- useful. Only a 10% increase from phase one was seen in participants who saw having other types of mobile technology (i.e. IPhone/blackberry) would be useful. Sixty-Four percent of the participants felt that having access to the EHR off-site or from home is not useful.

This is consistent with the type of sample as 53% of the participants are nurses and within their role they do not access medical information off-site and probably do not require mobile technology to communicate as part of their workflow.

On the other hand there were about 27% of the participants stating that it would be somewhat- to extremely- useful to have this type of technology or access available. We can assume these responses are from the allied health and physician group as part of their daily workflow they are physically mobile across the hospital.

From the total population there were about 8-11% of participants who did not have any opinion on these four areas. Table 8 below, shows a breakdown of the responses received by role. Each percentage has been derived from the total number of participant's responses in that role, and not from the total population.

Table 8

Participants' Responses by Role Regarding Mobile Technology and Access from Round Two Surveys

Mobile Technology & Access	Allied		Nurses		Other		Physicians	
	Useful	Not Useful	Useful	Not Useful	Useful	Not Useful	Useful	Not Useful
Access the EHR off-site or from home	50%	50%	5%	95%	0	0	83%	17%
Using tablet computers available to enter/access EHR information at the patient's bedside	75%	25%	78%	22%	0	0	67%	33%
Using mobile technology to enter/access EHR information	38%	63%	56%	44%	0	0	67%	33%
Using mobile technology to communicate with other care providers	50%	50%	72%	28%	0	0	67%	33%

There were 75% of allied health professionals who felt that having a tablet to enter patient information at the bedside would be useful. There was a 50/50 split when

asked if having access off-site and having mobile technology to communicate with other providers would be useful. There were 63% of allied health participants felt that having a mobile technology to enter or access EHR information would be useful.

Furthermore, there were 95% of nurses who felt that having access to the EHR off-site would not be useful. This is consistent with their role as they are usually doing shift work and it would be unusual for them to access information off-site after work. In the other three areas, 56-78% of nurses felt that tablet and mobile technology would be useful to enter or access information or communicate with other professionals, shown in Table 7 below.

Whereas for physicians who are often moving from one unit to another or from one hospital to another, having access off-site would work well with their workflow. Furthermore, 67% of physicians found it useful to have tablets or mobile technology to enter or access information and communicate with other clinicians.

Attitudes toward EHR adoption. Over 47% of the participants responded "Yes" when asked if they feel that healthcare workers were in consensus regarding their attitudes towards EHR adoption; this is a significant increase from phase one where only 15% of the participants said "Yes". This implies that there is a change occurring in the atmosphere of the organization and more and more individuals are becoming knowledgeable and informed of the changes.

General Opinions. Twenty-Eight percent of participants responded when they were asked if they had any comments or suggestions yielding a total of 10 comments. Eight of the comments referenced that the educational intervention was helpful to them in understanding electronic records. Two of the eight comments specifically referenced the

PaJMa models that were used to show the change that will occur in a before and after format. Although a few of these comments are displaying some nervousness and anxiety among the participants, the overall theme is the educational intervention was knowledgeable and informative. This is evidence that educating individuals can have positive effects on their attitudes and help them understand the upcoming changes and why the changes are occurring. In turn this will increase acceptance and end-user satisfaction. Representative participant responses are shown below:

"I really appreciated the presentation that showed the maps of how things are to how they would be." -*Nurse*

"Was good to see the maps of before and after the changes." -*Nurse*

"I have a better comprehension of the usefulness of having electronic records, but I am not fast with computers." -*Nurse*

4.4 Post-Intervention/Pre-Implementation Findings Summary.

In analyzing the phase two results there has been a consistent change with attitudes becoming more positive or the participants forming opinions. Overall it was found that: 1) the population had a good comfort level with computers basic skills; 2) there were high levels of users who never used the EHR; 3) overall attitudes about the system having increased control and monitoring was positive; 4) more than half felt that their worker patient relationship will not be negatively affected; and 5) overall attitudes towards EHR usage were positive.

As compared to phase one there was a noticeable difference in phase two results of participants forming opinions from phase one many participants did not have an opinion and selected "Don't Know", which could be due to the lack of knowledge. It can be assumed that the changes in the attitudes of the participants may be due to the

educational sessions provided which increased their knowledge. Furthermore, many comments were received regarding the impact of using PaJMa models in the educational sessions, as they aided in understanding workflows and acted as a change management tool. Literature also reports that training interventions targeted to increase self-efficacy could increase user acceptance (Venkatesh & Davis, 1996).

4.5 Post-Implementation Findings.

Phase three survey results were obtained after three to six months post implementation of the EHR. At this point the end users had the opportunity to use the new EHR in their daily workflow, giving them hands on experience and time to establish their own opinions. The exact same survey was used from phase one with some questions, from the general questions category, omitted and the questions were changed to be in the present and past tense, whereas in phase one and two the questions were asking about what would happen, now they were geared towards what has happened.

In phase three there were a total of 72 participants, out of a possible 821 healthcare workers who completed the survey online. Eighty-One percent of the participants enrolled worked primarily in the inpatient setting, which are consistent findings with phase one and two. Phase three makes up about 52% of the total sample size enrolled in phase two.

4.5.1 Demographics.

The participants were mostly females which made up 68%, 21% were males and 11% provided no answer, the female to male ratio was almost identical to phase one and two. The highest enrollment was seen of participants between the ages of 30-39 years at 29% and 40-49 years at 26%.

Among the 72 respondents it was found that nurses had the largest sample group at 61% with 44 participants, there were 10 allied health participants, 8 physicians, 6 from the other category and 4 did not answer, shown in Figure 15 below.

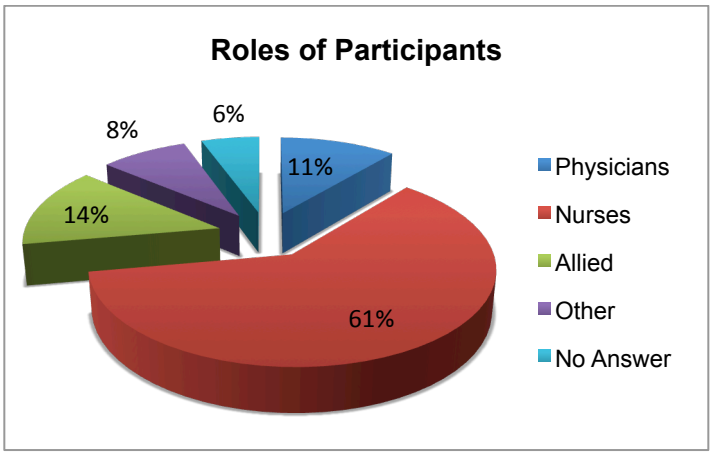

Figure 15. Roles of participants from round three surveys.

4.5.2 Computer Usage Background

In the pool of participants for phase three, 40% of the participants have never used an EHR in another facility and 49% have had some sort of past experience. Table 9 shows the breakdown of the responses obtained regarding the participants' experience with EHRs in other healthcare facilities.

Table 9

Comparison of Participants' Experience with EHRs from all Three Survey Phases

Question	Responses	Phase 1	Phase 2	Phase 3
What experience do you have with electronic health records (EHR) in other healthcare facilities?	Was involved with the implementation of an EHR in another facility	2%	0%	8%
	Was present for the implementation of an EHR in another facility	4%	3%	6%
	Have used an EHR in another facility	32%	11%	35%
	Have never used an EHR in another facility	53%	67%	40%
	No answer	9%	19%	11%

Furthermore, in regards to computer skills 51% of participants displayed "Novice" to "Basic" general skills and 42% had "Advanced" skills. There was a 10% decrease in the percentage of participants who have "Novice" to "Basic" computer skills since phase 2. We can assume that most of the participants are getting familiar using the computer to access patient charts and they feel that they skills are advancing.

4.5.3 Management Support.

It was identified that over 80% of the respondents felt that the EHR project is important to top management and that they are expected to use the EHR; these were the same findings in phase one. In terms of how management has implemented the system, 51% of the respondents agreed or strongly agreed that management did an effective job in implementing the EHR and 62% felt they were involved in the process. Furthermore, 64% of the participants agreed or strongly agreed that they were provided with effective training whereas the percentage of participants who disagreed or strongly disagreed increased from phase one at 5% to 15% in phase three. This shows that a few participants had higher expectations of the training.

When asked if they had access to resources that helped them understand the EHR the participants who disagree increased from 5% to 15% also, with 56% who agreed or strongly agreed. Overall, although there were a few participants who strongly disagreed, a consistent increase is seen in the number of views that strongly agreed in all the questions within this section. This implies that individuals are forming stronger opinions and having greater confidence in the system.

4.5.4 End-User Involvement During Implementation.

A series of questions related to end-user involvement during the implementation of the EHR yielded the following results; the participants agreed or strongly agreed that their

involvement increased their knowledge (64%) and made the EHR more useful (62%) and easier to use (60%). Over 58% felt that their involvement was a "must". From an overall perspective when the users were asked if their attitude has been positively affected by their involvement in the implementation, 61% either agreed or strongly agreed. Literature supports that the more end-users are involved the greater the acceptance of technology (Jarrar et al., 2000; Adler, 2007). Therefore, these results support user acceptance and minimal resistance, as there is a consistency of over 60% of individuals that are displaying positive attitudes, especially when taking into consideration that 20% of the participants did not respond.

4.5.5 Adequate Training.

Questions relating to training showed some fairly positive results. Only 15% of the respondents felt that they did not receive adequate and sufficient training in order to understand and use the EHR. Since there was a low percentage of individuals who felt they did not get sufficient training, it can be assumed that overall the staff was pleased and given skillful training to use the EHR. Furthermore, over 60% of the users either agreed or strongly agreed that the EHR training made the EHR easier and more useful to them.

Venkatesh & Davis have stated that training increases confidence or self-efficacy of the end user in using the system to perform job functions; which leads to greater users acceptance (1996). Therefore, we can assume that the end users are accepting EHR. There were a total of 76% of participants who felt that the training was essential for all staff whereas in in phase one 70% felt it was essential. When participants were asked if they preferred shorter training sessions only 13% agreed and strongly agreed and 42% wanted longer training sessions.

4.5.6 My Autonomy.

There were varying response seen among the respondents regarding their role with the EHR and the control it may or may not have over their clinical workflow. When asked if the EHR has increased the hospital administration's ability to control and monitor their clinical practice and decision-making, 41% of the participants agreed and strongly agreed which is fairly consistent with phase two results.

On the other hand when the respondents were asked if they feel that their attitudes about using the EHR has been negatively affected as a result of the increased control and monitoring of their clinical practices and decision making; the results found that 55% disagreed and strongly disagreed which shows an increase from phase two. This data shows that although there has been an increase of individuals feeling they are being closely monitored through the EHR, this did not affect their overall attitudes negatively as they may understand that the purpose of the EHR is not to monitor their workflow but to increase quality of patient care. This can be viewed below (Figure 16) showing how the participants' attitudes changed from phase one to phase three.

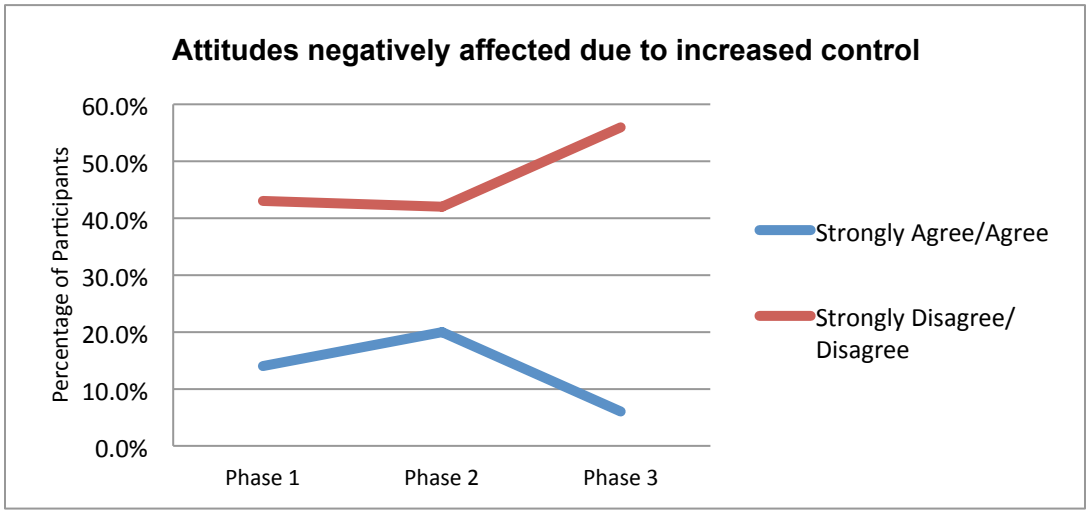

Figure 16. Changes in attitudes towards EHRs increased control over the three phases.

The responses of the participants towards if the EHR has 1) threatened their personal and professional privacy, or 2) has created legal or ethical problems were shown to be positive towards the EHR as 55% disagreed or strongly disagreed (a 16% increase from phase two results). There was an average of 8% of the participants who agreed and strongly agreed compared to 18% in phase two. It can still be assumed that this data represents that more than half of the respondents have confidence in the EHR and do not feel threatened by it.

This data was consistent with the findings of when the participants were asked their overall opinion on whether their attitudes have been negatively affected as a result of the security, legal and/or ethical concerns associated with using the EHR. Fifty-Four percent responded with disagree and strongly disagree (a 10% increase from phase two). There was a decrease from 17% in phase two to 6% in phase three of participants who agreed or strongly agreed. The changes of attitudes across the three phases are shown below in Figure 17.

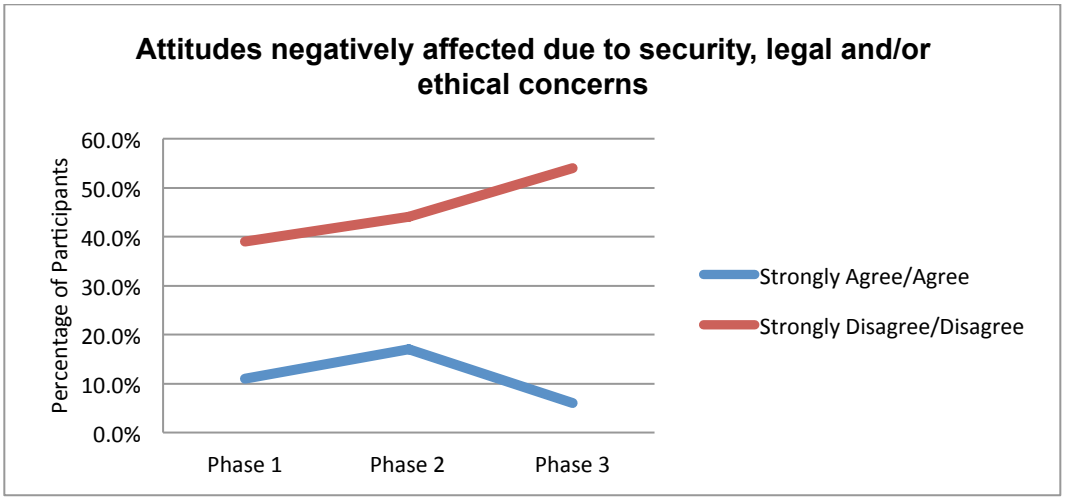

Figure 17. Changes in attitudes towards EHR concerns over the three phases.

4.5.7 Worker-Patient Relationship.

The data collected on the attitudes of clinicians towards the effect of the EHR on their relationship with the patient; shows that less participants feel that the EHR will negatively affect their relationship. There was an overall decrease in the percentage from phase two to phase three of participants who agreed and strongly agreed that their credibility was threatened (from 14% to 7% respectively). Furthermore, there was also a reduction in the patient's satisfaction with the quality of health care she/he receives (from 28% in phase two to 17% in phase three). When asked if their patient's confidence diminished because they saw them using computer-based technology as a diagnostic aid the data obtained from phase two to three was similar. Only 17% of participants agreed or strongly agreed that the EHR interfered with the effectiveness of the healthcare professional and patient interaction, whereas it was 28% in phase two. There were a high percentage of participants (26%) who did not answer any of the questions in this section, which has been taken into account when making conclusions on their attitudes.

It can be assumed that after using the system for a few months the participants have been able to apply their training to get comfortable with the system and understand the benefits at a practical level. With the increased experience and knowledge it can be assumed that there is greater user acceptance and these results support this conclusion. Furthermore, when users are supported by management and learn the system well over time they will also get faster in navigating the system so that they spend less and less time at the computer and more time with the patient.

4.5.8 Ease of Use.

Almost 44% of the participants either agreed or strongly agreed that their interaction with the EHR has been clear, understandable and user friendly; and that learning to use the

EHR was easy for them (a decrease from 50% in phase 2). Alternatively, the percentage (18%) of participants who felt that the EHR was not user friendly remained almost same from phase two to phase three. Figure 18 below shows the change in attitudes over the three phases. The results show that majority of the users that responded that the EHR is not user friendly have Basic to Novice skill set, so it may take them a little longer to learn the system.

Research supports that if end users find the system easy to use that is a predictor of user acceptance. Since the results obtained in this study display that only 20% do not find the system to be user friendly, it can be assumed that there is a high user acceptance among the end users in the organization.

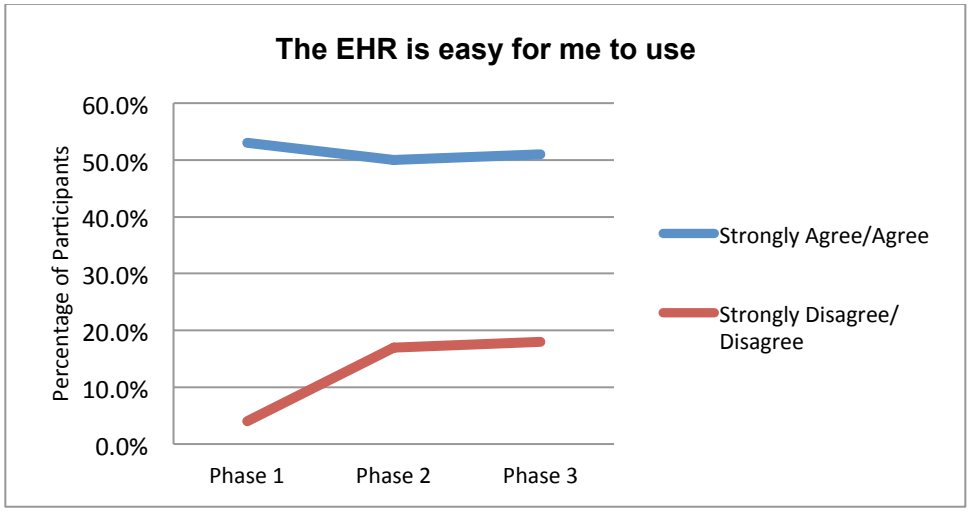

Figure 18. Changes in attitudes regarding EHR ease of use over the three phases.

Furthermore, the participants who felt the EHR was not easy to learn decreased from 36% in phase two to 18% in phase three. These results imply that possibly before the individuals had anxiety about learning the new system and did not understand the complexity, but since now they have gone through training and have started using the EHR it seems easier for them and hence the positive survey results.

Additionally, when asked if the participants have become skilled at using the EHR 54% agreed and strongly agreed and only 17% disagreed or strongly disagreed. In phase two 60% expected to become skilled and 54% felt that they did in phase three.

4.5.9 Perceived Usefulness.

When the participants were asked if the EHR has allowed them to provide better patient care 39% agreed or strongly agreed (a decrease from 56% in phase two). In regards to whether the EHR has improved patient safety there was a decrease from 67% in phase two to 44% in phase three. It can be assumed that in phase two after the educational intervention the benefits of the EHR were highlighted with positive factual information from previous research studies; but now the users are basing their attitudes on real experiences. Furthermore, there is a possibility that the end users do not know how to gauge if there is an increase in patient care or safety in a practical setting; and hence the lower percentage of individuals who agree. As in the educational intervention percentages of how medication errors decreased were presented to emphasize the benefits, but here they do not have this information for their organization to make a judgment on increased patient care or safety. Table 10 below shows a breakdown of the attitudes of participants by role on if the EHR improves patient safety.

Table 10

Participants' Attitudes on if the EHR Improves Patient Safety from Round Two Surveys

EHR improves patient safety	Allied	Nurse	Other	Physician
Strongly Agree/Agree	50%	38%	50%	63%
Neither Agree or Disagree	14%	14%	0%	25%
Strongly Disagree/Disagree	0%	19%	0%	0%
Don't Know/No Answer	36%	29%	50%	13%

The figures below displays how the attitudes of participants have changed over the three phases in regards to if the EHR has improved quality of patient care (Figure 19) and patient safety (Figure 20). Furthermore, there were a high number of individuals who did not provide an answer.

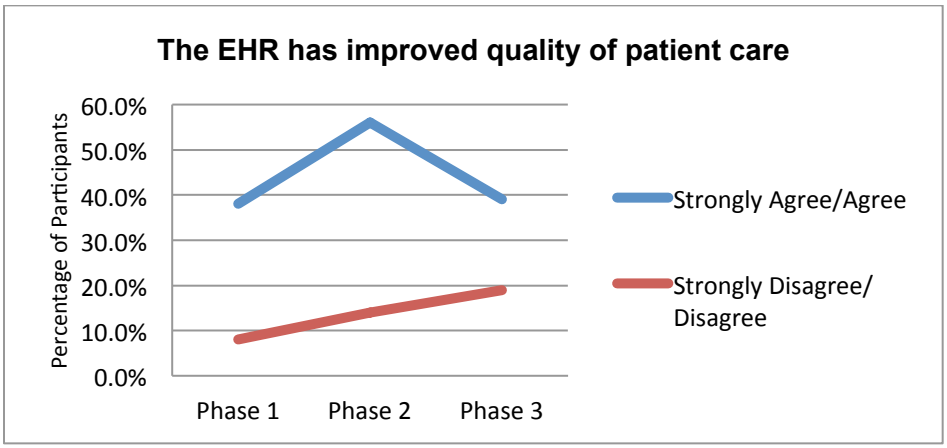

Figure 19. Changes in attitudes regarding EHRs improving quality of care over the three phases

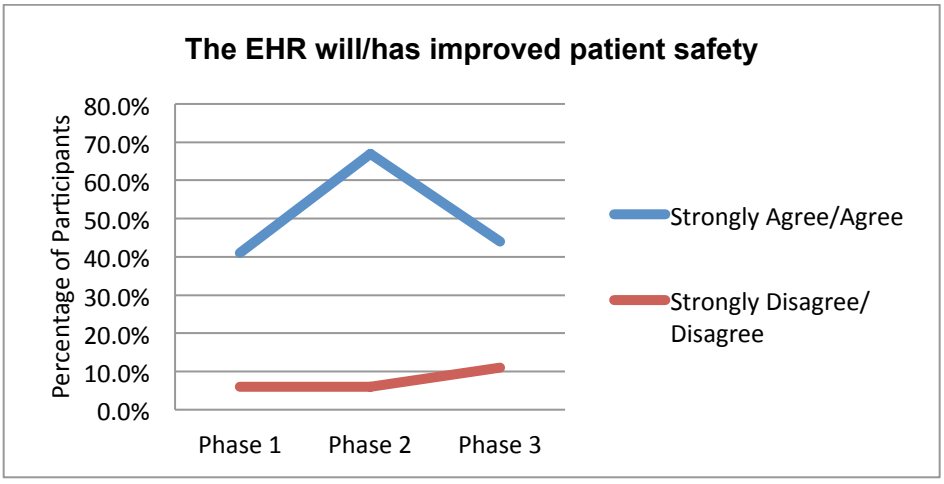

Figure 20. Changes in attitudes regarding EHRs improving patient safety over the three phases.

Additionally, 50% of the respondents agreed or strongly agreed that the EHR has improved communication between clinicians, this is a decrease from 75% in phase one.

The participants' attitudes have changed in regards to the EHR helping them to accomplish tasks more quickly from 50% in phase two to 39% in phase three.

Additionally, 36% of respondents agreed or strongly agreed that the EHR has enhanced their overall effectiveness in their job (a decrease from 58% in phase two). Furthermore, 33% believe that it made their job easier to perform (a decrease from 69% in phase two). This decrease in positive attitudes towards the benefits of the EHR can imply that the EHR is taking time away from the patient as the users are still in the process of getting use to it and there may be some frustration.

On the other hand, 63% of respondents feel that inter-professional documentation has become more clinically useful, easier to read and more accessible in the electronic environment. 56% of respondents feel that the EHR has become a useful tool for practicing their profession. Figure 21 shows that there is a consistent small percentage of participants across all phases who disagree with the EHR being a useful tool. Therefore, it can be assumed that user acceptance is high.

This is also supported by literature that states that if end users feel that the technology will provide them with benefits and aid in their professional work, they are more likely to accept it (Legris et al., 2003; Morton & Wiedenbeck, 2009; Venkatesh & Davis, 1996; Brown et al. 2002).

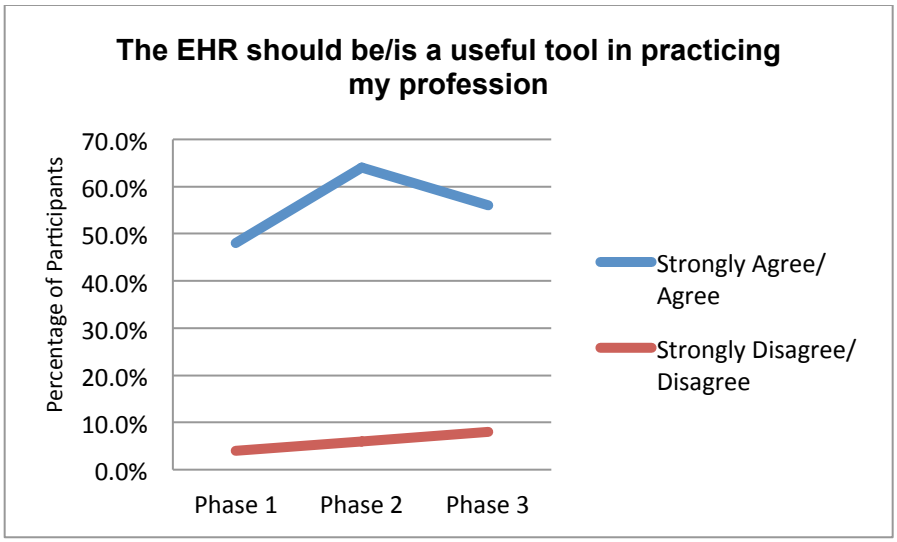

Figure 21. Changes in attitudes regarding EHR being a useful tool over the three phases.

4.5.10 Attitudes on EHR Usage.

There were 42% who agree or strongly agree that the EHR is helping provide better care and two-thirds of the participants will encourage the use of the EHR among their colleagues. When asked about if their overall attitude about the EHR usage is positive 61% agreed and strongly agreed, whereas in phase one it was 58% and phase two it was 75% (shown in figure 22 below).

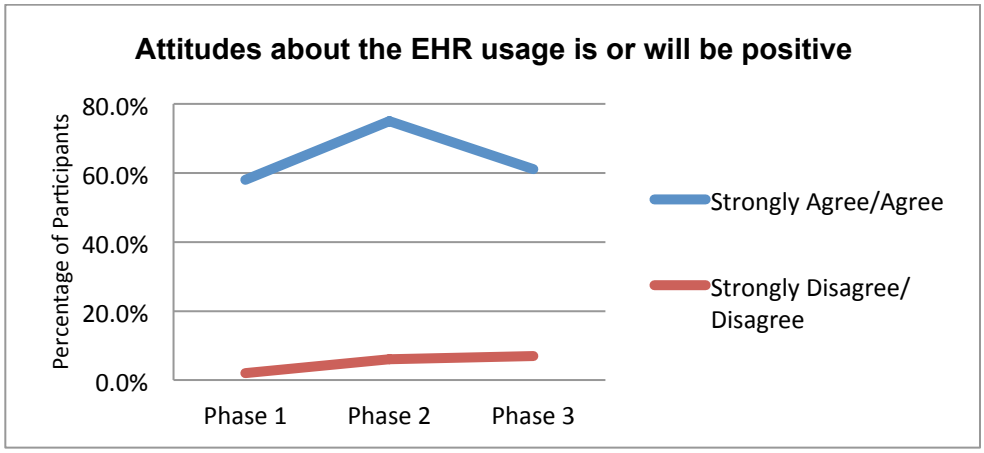

Figure 22. Changes in positive attitudes regarding EHRs over the three phases.

Additionally, only 32% of the participants feel that they are not satisfied with using the paper-based patient record at their job. On the other hand 58% of the participants agreed that comprehensive health records have become more easily accessible with the new EHR; this is a significant increase from phase one where only 46% agreed but a decrease since from phase 2 where 89% agreed. Overall in this section there was a high percentage (25-30%) of participants who did not answer any questions. A breakdown of the percentage of responses from participants regarding accessing comprehensive health records is shown in Figure 23.

Literature supports that if end users are feeling that the system is helping them do their job more efficiently that is a good predictor of user acceptance (Legris et al., 2003; Brown et al., 2002; Venkatesh & Davis, 1996; Wilkins, 2009). Therefore, these results are showing positive results and it can be assumed that user acceptance of the EHR is high.

This data is implying that the participants are starting to understand their role and the accept role that the EHR is playing in their daily workflow with patient care. This is especially reflective in the question that asked if they need the EHR to provide better patient care; there were 39% respondents that agreed or strongly agreed and only 11% of participants who disagreed or strongly disagreed, compared to phase one and two where it was 18% and 33% respectively disagreed.

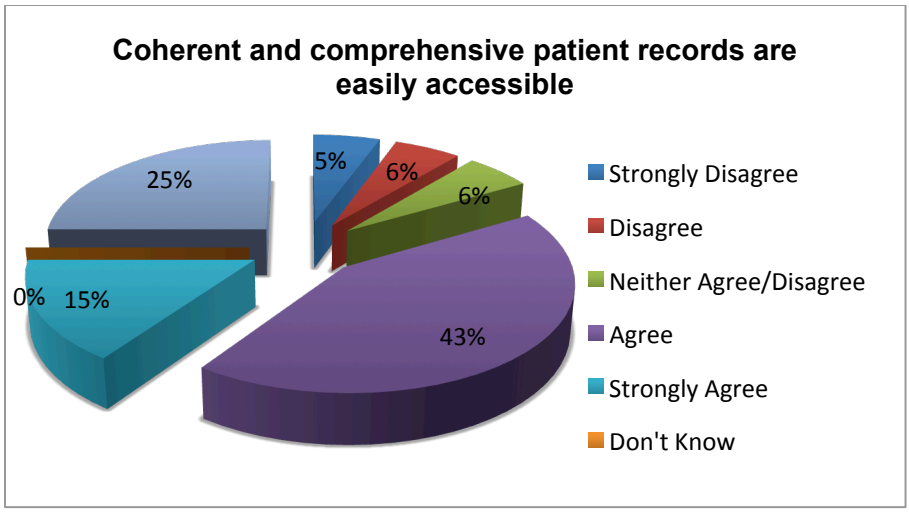

Figure 23. Participants' responses on accessible patient records from round three surveys.

4.5.11 General Questions.

Mobile Technology and Access. A series of questions were asked about how useful mobile technology has been to enter/access EHR information or communicate with other care providers. Thirty-Five percent of participants feel having a tablet to enter/access patient information at the patient bedside has been somewhat- to extremely- useful. 43% did not provide any opinion on this subject. The percentage participants who found having other types of mobile technology (i.e. IPhone/blackberry) has been useful have remained almost the same from phase two.

There were 41% of participants in phase three who felt that having access to the EHR off-site or from home would be beneficial to patient care; although there was 40% of participants who did not provide their opinion on this subject. This data obtained is consistent with the type of sample as 61% of the participants are nurses and within their role they do not access medical information off-site and probably do not require mobile technology to communicate as part of their workflow.

General Opinions. Thirty-Two percent participants responded when they were asked if they had any comments or suggestions, which resulted in 23 comments. The themes that emerged from the participants' comments included having more training or refresher courses for themselves, and they also feel that doctors needed more training. Some participants had specific complaints about system functionality on how the build was designed or the system was freezing. Some participants feel that it is taking time away from the patient and others state that it helps with their clinical practice and information is easily accessible.

Although a few of these comments are displaying some frustration with the system among the participants; overall, the comments present an image that users are accepting the new technology, as they would like more courses or would like to see improvements. Very few comments show negativity or resistance towards the new EHR. Representative participant responses are shown below:

"The EHR has made my clinical practice better!" -*Nurse*

"Generally happy with EHR and still learning, having access to information is very helpful, find it does take me more time to document however when I need to find information again it is much easier and time is saved." -*Physician*

"Very little time is available for actual patient care and or contact as staff have to spend far more of their day working on their computers/charts and making sure all their "clocks" are checked off. Patient/Staff interaction has decreased considerably as staff need to be in the office on computers catching up on demands of charts, ensuring everything is completed" -*Nurse*

Chapter 5 - Summary & Discussion

In this chapter, the main findings of the research study are discussed and how they are linked to the existing literature on change management, and use of interventions and tools to increase end user acceptance of technology. Furthermore, the effectiveness of the change management tool that grouped together all the various factors such as process modeling, process improvement, and increasing EHR adoption and leading to an implementation of an EHR, is discussed and recommendations are made for future implementations.

5.1 Attitude Changes Over Three Phases

Firstly, there was a decline seen in the number of respondents who participated in the survey from phase one and phase two had the least number of participants. The low number of participants could be due to few factors: 1) survey fatigue, as the organization was already doing many other surveys in other areas; 2) no incentives, the participants were not given any reward; 3) the timelines that were integrated with the implementation of a new system which could already by overwhelming.

The accumulation of the data collected from all three phases showed a story of the participants' attitudes. It displayed how the attitudes and perceptions of the respondents changed over time with the changing external variables (i.e. educational intervention, training, and implementation). Overall, there was a noticeable increase in positive attitudes seen in phase two after the educational intervention was provided; and in phase three although there was a decrease in the percentage of participants who had positive attitudes it was still an improvement from phase one. This change in positive attitudes in the various themes can be seen below in Figure 24; the questions used to create this graph

can be found in Appendix G). Please note that no data was collected around management support in phase two; as it was assumed that it would remain constant, and an attempt was being made to improve the response rate by simplifying the survey. The next section addresses all the research questions and if the results obtained either supported the hypotheses or not.

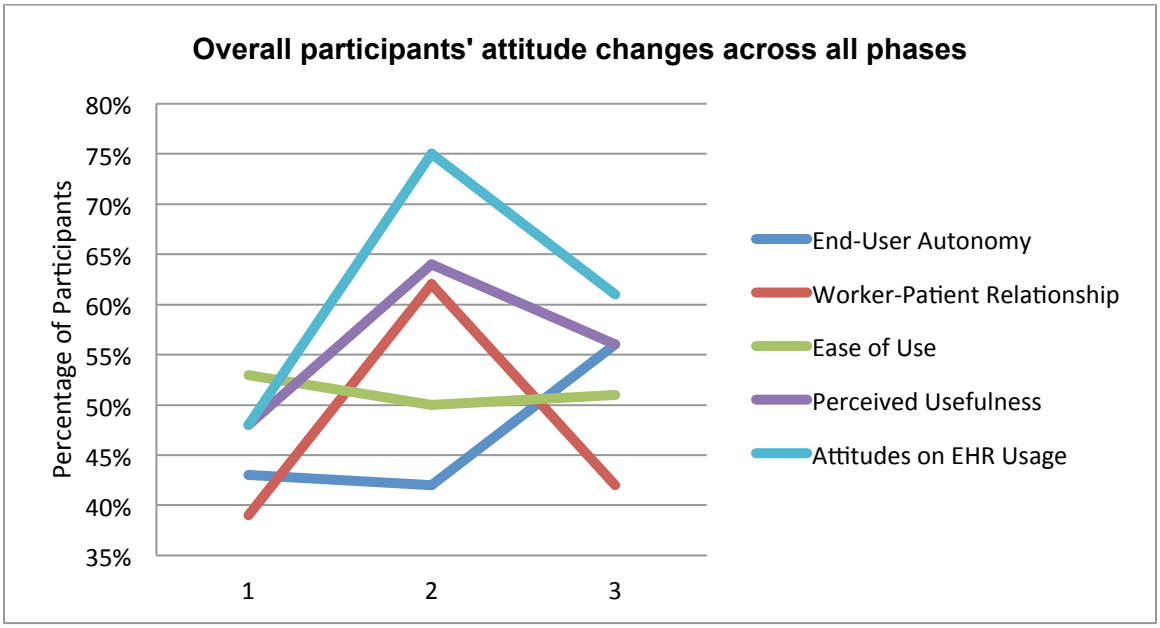

Figure 24. Overall changes in positive attitudes of participants across all three phases.

5.2 Answers to Research Questions

Research Question 1*: *Can an intervention be proposed in the form of the change process model to support the transition from no electronic health record to the use of an electronic health record? Overall the transitioning from paper to an EHR was strongly supported by the change process model applied in this study. This is supported by the data collected around the following categories: firstly, the user's autonomy which was shown to be the most positive post-implementation and not after the intervention, this could be due to the realization that the benefits outweigh the monitoring capabilities

of the EHR. Secondly, with respect to the user's perception of worker-patient relationship a considerable increase in participants, who felt that the EHR will allow them to provide better quality of care and improve patient safety, was seen in phase two. Thirdly, perceived usefulness, as the users believed the EHR was a useful tool for practicing their profession. Lastly, although there wasn't any significant increase in participants who felt that the EHR will be easy to use in phase two, this could be due to the direct affect of the type of intervention.

As there was a lack of information in the presentation that addressed the ease of use of the upcoming EHR. Hence the users did not have the knowledge to evaluate if the system would be easy for them to use. Furthermore, the clinical informatics team was already providing the participants with hands on training of the system just before or after the intervention. Therefore, addressing system use in the intervention would have been a duplication. According to literature end users need to understand the ease of use of technology in order to increase user acceptance. Unfortunately in this study the intervention did not accomplish this.

Research Question 2*: *Can an intervention during the change process model aid in changing attitudes of healthcare professionals in regards to current or future IT adoption (EHR)? Generally, the data has shown a consistent change in attitudes and an increase in the response rate after the intervention was delivered. There were higher number of participants who displayed positive attitudes in their perception of the usefulness of the system and their overall attitudes towards the EHR; this is shown in Figure 24 where you see the spike in phase two.

Although there was a significant increase in the positive response of the participants in regards to the EHR being a useful tool in their profession after the educational intervention, there was a decrease in phase 3. It can be interpreted that in the educational session the participants were provided with factual and statistical information on how, for example, medication errors have been decreased by EHRs at other hospitals and other benefits of the EHR in regards to increased accessibility, legibility and comprehensive patient records. This intervention gave them the ideal picture of EHRs that is being used to their maximum potential. Hence, the perceptions of the respondents became more positive and they began to believe that their EHR would do the same for them. Whereas in phase three there was a decrease as now they have been using the system for a few months and the system may have not met their expectations. The decrease can also be due to many other factors; they may not have the ability to assess if the EHR has made patient care better than having paper records. For example, in the interventions that were delivered statistics were shown around how medication errors reduced or number of duplicate test reduced which aided in increased patient care; but this type of information was not available to the participants and therefore they could not assess the increased benefits of the EHR. Additionally, they could have been encountering some initial issues or glitches that the health informatics team was resolving during implementation, and this may have frustrated them and changed their opinions.

Where as the attitudes of the end users towards their autonomy stayed fairly the same across the different phases of the survey, the number of responses received did increase. It can be assumed that the intervention made the respondents more knowledgeable, which aided them in forming opinions about IT adoption. Literature also

supports that increased knowledge of the upcoming system and the more end users perceive the system to be useful will lead to greater user acceptance and IT adoption.

Research Question 3: ***Will increased education reduce resistance to IT adoption and improve chances of technology acceptance?*** Overall the intervention, which was delivered as an educational session, did yield greater positive attitudes and an increased number of opinions, which can be assumed as a precursor for technology acceptance, as literature also states that educating end users can increase IT adoption (Wilkins, 2009; van der Meijden et al., 2001). This increase in knowledge regarding the benefits of EHRs was supported by the data collected in the following survey categories: perceived ease of use, worker-patient relationship and attitudes about EHR usage; as users had more positive attitudes. Literature supports that the increased knowledge of end users on the benefits of the EHR is a good predictor of user acceptance (Wilkins, 2009; Adler, 2007).

Literature around TAM has also highlighted that positive attitudes on perceived ease of use are also important to increase user acceptance (Chismar & Wiley-Patton, 2002; Venkatesh & Davis, 1996). In this study, the intervention did not have a substantial impact in this area, as the number of participants with positive attitudes towards the ease of use did not increase significantly in phase two as shown in Figure 24 above. This could be due to many factors: the time the intervention was delivered as for some groups the educational session was given before they received training and for some it was after. The type of system training that they received from the clinical informatics team was not controlled, for example there were a number of different trainers and all had different training styles, and could have had an impact on the

participants' responses. The other factor could be related to the fact that the educational session did not address system functionality and how the users interaction would be with it, therefore for the users who have basic skill sets and are not as comfortable with new software, could have been overwhelmed with the training sessions.

Research Question 4: ***Can process modeling (current and future) patient journeys help identify the inefficiencies in process flows, and can they be useful in educating healthcare professionals about the benefits of EHR?*** Using the PaJMa models in educational session aided the participants in understanding their current state and the upcoming changes with the new EHR. It was evident that it did not take the users long to understand the maps and how to read them. The comments received from the respondents are good evidence that the PaJMa models put things in perspective for them. Allowing them to see the before and after picture of their workflow certainly emphasized the inefficiencies and improvements that were going to occur with the EHR.

Research Question 5: Can the change management process be applied to support EHR adoption in mental health**?** The greatest increase in positive attitudes was seen in their general opinion towards the EHR from phase one to phase two. Although the number of participants who agreed and strongly agreed dropped from phase two to three there is still a significant change from phase one to phase three. This drop in positive attitudes could be due to the system, as the intervention may have raised their expectations too high, and the system did not meet their expectations.

It can be interpreted that since there was a substantial change in the attitudes of the end users and majority were still positive in phase three, this could imply that there was a high user acceptance of the EHR. In regards to the other users who disagreed or

had no opinion, there are the system factors that may be affecting their attitudes. Factors such as, if they are not happy with the way the EHR is built, or if they are experiencing system slowness or glitches, this could have impacted the results. Data was not obtained on the system build, therefore which factors affected the results cannot be defined, this is one of the limitations of the study. Furthermore, from my consulting experience it is shown that if follow-up on the use of the system is not conducted the data quality of the information collected may decline or certain system functionality may not be used. This study did not gather information on system usage and if it was being used as intended, this is something that should be addressed in future studies.

The conceptual model used in this study was successful in answering the research questions. It was successful in assessing the factors influencing healthcare providers' attitudes towards EHRs and their variations over the implementation period. Furthermore, the educational intervention provided to participants worked as a change management tool to help with the transition, reduce resistance, and increase IT adoption. The support of management could also have be a factor for increased IT adoption, as this has been seen in previous studies in literature. The results also support that the PaJMa models that were used during these educational sessions aided in changing attitudes of health professionals and acted as a change management tool. Lastly, the mental health facility is showing high adoption rates as the end users are using the EHR in their daily workflows.

5.3 Moving Forward

Based on the findings from this study, and support from past literature, combined with my personal consulting experience, and the change process model used in this study,

with a few modifications, is being recommended for other organizations to use and apply to increase EHR adoption. The modifications made to the model were able to make it more action plan orientated and complete. The modifications made were to incorporate some management tasks that have been suggested in the literature review such as communications to staff, training, support and following up with users. Hence, this has increased the number of phases of the change process model from 7 to 10 phases. This change process model now includes a 10 phase approach and is called the ATS (Aim to Sustain) Model, which will aid in changing the attitudes of end users and lead to successful implementation of information technology.

Phases of the ATS Change Process Model include:

1) **A**udit
2) **I**nform
3) **M**odel
4) **S**urvey
5) **U**nify
6) **S**olve
7) **T**rain
8) **A**doption by Implementation
9) **I**ncrease Support
10) **N**eed to Follow-Up

Phase 1: *Audit Current Processes:* Understand the organization's processes, why and where will the technology be used. Model these processes using PaJMa to have a visual perspective to identify the gaps and assess where the inefficiencies are, and where possible improvements can be made.

Phase 2: *Inform of Upcoming Change*: Management informs the end users of upcoming technology changes and is heavily involved in every upcoming phase.

Phase 3: *Model the Future State:* Model future state processes using the PaJMa technique. Involve the end user to review modeled clinical processes and get their

feedback on how to improve. The end user should feel they were a part of the improvement process.

Phase 4: *Survey end users:* Survey end users to understand their concerns and elements of resistance toward the EHR.

Phase 5: *Unify through Educational Interventions:* Unify the end users by educating and empowering them with knowledge about the technology, the benefits it will bring and how it will improve their daily workflows through interventions, such as educational sessions. Use the information that was collected in phase 4 and ensure their concerns are addressed through the interventions. Furthermore, incorporate the process models to highlight the current state workflows and focus on the improved workflows. This will help emphasize why the new technology is needed.

Phase 6: *Solve Gaps in Process Flows:* Solve gaps in process flows with the end users and involve them in the build and review of the system and introducing new improved processes.

Phase 7: *Train* the end user on the new technology. Assess the users' knowledge retention and re-train if necessary.

Phase 8: *Adoption by Implementation:* Implement the technology; use the strong end users who have been involved to assist with support during the implementation process.

Phase 9: *Increase Support*. The users should know that they have support if they get stuck with the new technology. Management support is critical to identify the weak areas and address any process or knowledge issues so measures can be taken to resolve them. The greater the support the happier the end users will be and they will also be more understanding and patient when glitches do occur.

Phase 10: *Need to Follow-up* with end users, conduct surveys to obtain feedback. This is one of the most important phases because follow up ensure the technology is being used and being sustained as intended. Sustainability of any IT system is vital to ensure the system is being maximized and used appropriately to its full potential. This is even more important in healthcare because of patient safety. Furthermore, when feedback is attained from end users, new processes may surface at times that were not identified before, or areas of enhancement may be recognized. In order to address these areas of improvements this change process model can be applied again by starting at phase one.

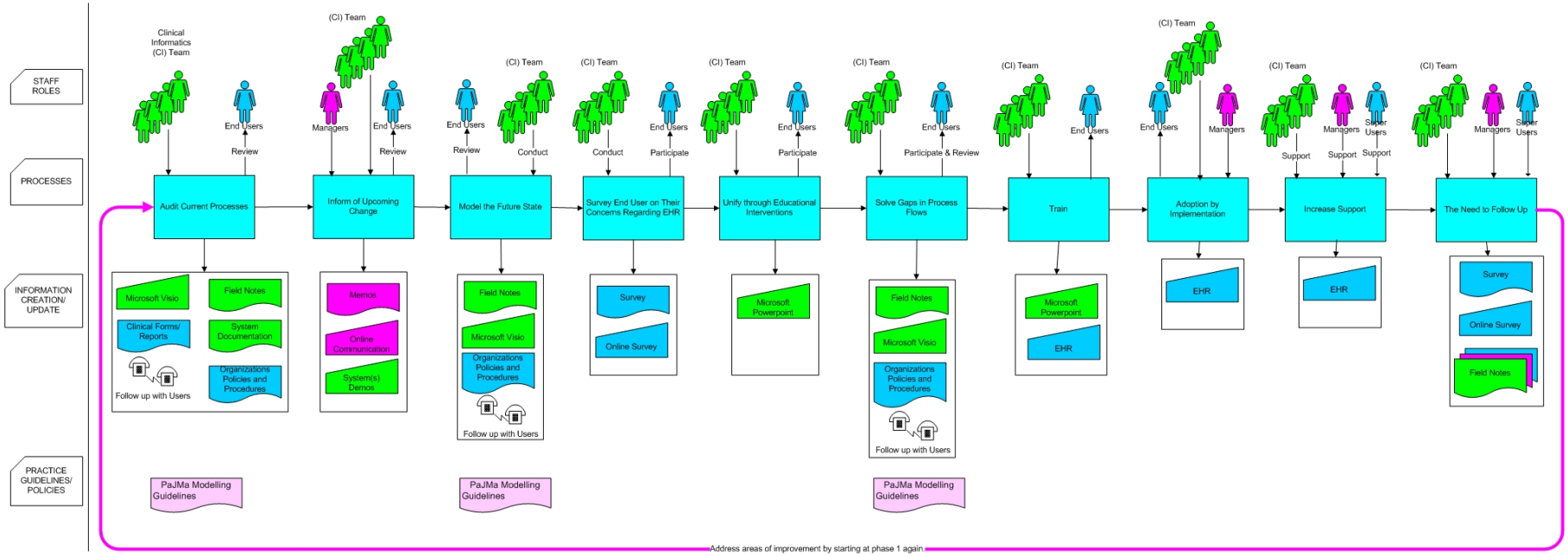

Figure 25. ATS Model presented in the form of a PaJMa process map.

Chapter 6 – Conclusion

Information technology is growing and enhancing year by year and the benefits are becoming well known. Looking at the healthcare sector in particular there are many initiatives that are being taken worldwide to incorporate EHRs in various healthcare facilities. These E-health innovations have been shown to have the potential to optimize the delivery of care, by enhancing the communication channels between healthcare providers, and reducing wait times. Despite the advantages of technology, the healthcare sector is behind in adoption due to its complex processes that deal with patients' health care. Due to the complexity of healthcare facilities it is important that technologies, such as EHRs, are implemented appropriately and are accepted by end users.

User acceptance of technology has been reported to be a major challenge in various organizations, and this is not limited to healthcare facilities. Existing evidence indicates that one of the most important factors for successful implementation of information technology is users' adoption and use of that technology. Thus, a proper change process model is required that can be followed to ensure successful implementation.

The study results demonstrated that in phase one there was a lot of uncertainty and lack of knowledge among the participants and some negativity towards the EHR. In phase two, with the introduction of the intervention, the results revealed that the participants were forming opinions and their attitudes were more positive. After the implementation there was once again a change in the attitudes as they become less positive. Interestingly the one category of ease of use increased considerably in phase three.

Implications of the findings suggest that the intervention needs to emphasize the ease of use of the upcoming EHR. As any increase in the positive attitudes towards the ease of use of the EHR would directly influence the participants' attitudes and hence increase EHR adoption.

6.1 Limitations of the Study

Despite the important information provided by this study, there are a few limitations to be considered. Since the participants were not given a unique ID in phase one, the results obtained in phase two and three were not from the same group of participants in phase one. Therefore, there is a lack of linking results from one phase to the next. Since the results were not linked, it cannot be stated firmly that attitudes of specific individuals changed to become more positive or not. Hence, the results obtained at each phase represent the general views of the population and therefore the changes in attitudes of one particular participant cannot be determined.

Furthermore, this study relied on self-reported responses, this could lead to misinterpretation, exaggeration, users feel embarrassed to reveal private details and the possibility of bias is high.

The timing of the intervention was a limitation due to the fact that it was not given consistently at the same time. Some groups received the intervention prior to their system training and some received it after. Since the content, timing and trainer of the training sessions were not controlled there is a possibility that it may have had an impact on the opinions of the respondents in phase two. Depending on the experience they were having with the system training, positive or negative, it may have skewed their responses.

Furthermore, sitting through six to seven hours of the system training, the potential participants may have been experiencing fatigue as well.

6.2 Future Research Recommendations

Future research studies should concentrate on conducting prospective studies to understand the change management factors, which aid in successful implementation and increase user adoption. More pre-post longitudinal design studies are required in the healthcare sector that follows the full implementation process; there is a large gap in literature around this. Furthermore, this change process model needs to be applied to acute care settings as well, as in this study a tertiary care Centre for Mental Health Sciences was used. There is a considerable difference in the workflows of acute care vs. tertiary care therefore the validity of this change process model needs to be evaluated.

Additionally, the use of PaJMa modeling in acute care hospital settings is also required to evaluate if it will provide the same benefits as this study and help with the change management process.

The need to connect different facilities and hospitals is becoming evident and many initiatives are currently in place to provide seamless care to patients who move from one facility to another. Applying the same model to the health system would be beneficial in determining its effectiveness across facilities.

Research on the sustainability of the EHR are required to understand if end users are using the EHR to its maximum potential and the data quality of information is high and useful to physicians in their decision making process. As even with advancements in technology, the same issues noted in the paper environment can arise such as inaccessible

or duplicate patient information. Therefore, looking at future research that investigates these areas is important as well.

Although technology has many intended benefits, its important to do research if these benefits are in fact improving patient care and not changing the focus of the organization towards efficiency of the technology and away from patient care.

Lastly, research on the suggested 10 phase change process model is needed in different healthcare facilities that will be implementing information technology to evaluate if the model promotes user acceptance and technology adoption.

6.3 Conclusion

From these results it can be concluded that the use of an intervention to help the end users understand what technology is being implemented, and why it is the right choice by highlighting its benefits is very important for EHR adoption. The mental health facility has a high acceptance rate of the EHR and the end users are using it in their daily workflows. This could have been due to a direct effect of all the change management activities that were done, from end user involvement in improving processes using PaJMa models, management support, and the educational intervention to empower users with knowledge on the EHR. In a collective view of all these activities and the impacts each may have had on the users, this change process model was successful and could be applied again for upcoming change management projects.

The use of PaJMa models in healthcare was highly accepted and from the results obtained the end users found them helpful. Using this type of method for future projects would be beneficial to improve processes and to be used as a change management tool to inform the appropriate stakeholders. Although the modeling process is time consuming

initially, it has shown to be a multi-purpose tool, which aids in future technology adoption, hence, could in turn save time in the future. With the results of this study there is strong evidence that these models will be very beneficial for future technology implementation and process improvement projects.

The results obtained from this study are parallel to what literature also supports. In summation, the more the end users are involved supported and informed the greater the chances of technology acceptance. There are many applications that the end user may be required to use and saying that applications will always work perfectly with no issues would be incorrect. However, as long as the users have the knowledge and they are aware that they will be supported, it would be safe to say that they will be open to accepting the faults as well and will find ways to work with it.

The methodology used in this study is not limited to applications such as EHRs; it can be applied to any information technology projects in any organization. Since the findings support the literature and past studies done in various business sectors and are not limited to healthcare, these findings can be generalized to any change management projects that require technology acceptance. The principles remain the same around user acceptance and user adoption of technology.

The evidence gathered from this research study, around all the factors associated with successful technology implementations, has strongly supported and verified past literature and also has laid the foundation not only for future research, but action plans to be applied to new projects. Hence, the suggestion of the 10 phase ATS model can be executed and assist with other technology implementations projects in various healthcare settings.

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Timeline-Deliverables

Item	Date
Research Ethics Board Approval (OS)	Mar 2010
Research Ethics Board Approval (UOIT)	Jun 2010
Thesis Proposal Version 1	Feb 2011
Case Study	Feb 22, 2011
Change Management section (lit review)	Apr 18, 2011
Revised version of proposal (with case study and change management section)	Apr 25, 2011
Develop outline of chapters to complete for thesis	May 2011
Finalize thesis proposal	Oct 10, 2011
Methods: Change process model	May 1, 2013
Results + Case study	May 3, 2013
Analysis	May 18, 2013
Conclusion	May 30, 2013
Submit completed thesis to research supervisors	July 8, 2013
Research supervisors review & comment	July 29, 2013
Submit thesis to GDP	Oct 1 2013
Oral Exam	~Oct 25, 2013

Timelines – Case Study

Item	Date
Invitational letters & memo sent to managers/staff	Jun 2010
Current state PaJMa modeling commences	May/Jun 2010
Phase 1 surveys	Jun 2010
Phase 1 surveys-Reminders	Jul 2010
Future state PaJMa modeling commences	Jul 2010
Analyze phase 1 survey results & develop intervention	Aug 2010
Conduct intervention and phase 2 surveys	Sep 2010
Phase 2 surveys-Reminders	Oct 2010
EHR implementation	Oct/Nov 2010
Phase 3 surveys	Feb/Apr 2011
Phase 3 surveys-Reminders	Apr/May 2011
Survey analysis of all surveys (trending, relationships, changes over time)	Nov 2011

Publication Plan

The change process model that is outlined above can be a valuable tool for other organizations that are trying to introduce new technology and information systems. Therefore, in order to share this model and the mental health case study's findings multiple papers will be submitted for publication to various journals:

1) *Paper Title*: Change Management Process Model for Technology Adoption

   Journal: Journal of Organization Change Management

   Date: Early 2014

2) *Paper Title*: Nurses' Attitudes Towards Electronic Health Record Adoption

   Journal: Online Journal of Nursing Informatics

   Date: Early 2014

3) *Paper Title*: IT Adoption Through Process Modeling and End User Involvement

   Journal: Health Informatics Journal

   Date: Early 2014

Appendix A - Survey

My name is Amardeep (Nina) Joshi and I am a Masters student at UOIT; and am conducting my research here at Ontario Shores with the support of my supervisors Dr. Percival and Dr. McGregor and Dr. Fischler from Special Services. This survey is intended to gather the attitudes and perceptions of all health care professionals at Ontario Shores in regards to Electronic Health Records (EHR). EHR refers to the future state of electronic integration of all components of the patient care record including provider entered documentation, computerized-provider order entry, and lab results viewer. Specifically, EHR represents the planned implementation of the Meditech 6.0 product. Furthermore this survey will allow the identification of the education needs of staff members and how the organization can support your transition from paper records to an EHR. The survey should take about 15 minutes to complete. All data collected is anonymous, will be used for research purposes only and stored in a secure location. At the end of the study a summary of the results will be made available to any interested party.

Participation in this survey is voluntary; by continuing to complete the survey you have consented to participate in this study. We would like to thank you for agreeing to participate in the survey and we greatly appreciate your support. You may withdraw from this study during any phase and at any time without consequences. If you have any questions or concerns please contact Amardeep (Nina) Joshi at 416.402.4578 or Amardeep.joshi@uoit.ca. This research study has also been approved by the UOIT research ethics board (REB# 09-116). If you have any concerns regarding your rights as a participant, please contact the Ethics and Compliance Office at compliance@uoit.ca or by telephone 905 721 8668 ext. 3693.

Background Information

1. Gender (optional): ☐ Female ☐ Male

2. Age (optional):

- ☐ Under 30 years
- ☐ 30 – 39 years
- ☐ 40 – 49 years
- ☐ 50 – 59 years
- ☐ 60 years and older

3. How long have you been working in the health care field? (Select one)

- ☐ Less than 5 years
- ☐ 5 – 10 years
- ☐ 11 - 15 years
- ☐ More than 15 years

4. In which setting do you primarily practice? (Select one)

- ☐ Inpatient
- ☐ Outpatient (on-site)
- ☐ Outpatient (off-site)

4b. Which area/department do you primarily work at?

a) Adolescents (ADOL)

b) Assessment/Reintegration (ARP)

c) Forensics (FACT)

d) Special Services

e) Special Populations

f) Vocational Services

g) Integrated Health Services (HIS)

h) Other

4c. What is your role at Ontario Shores?

- ☐ Child Youth Worker
- ☐ Clerical
- ☐ Clinical Nutritionist
- ☐ Diagnostic Imaging Technician
- ☐ Lab Technician
- ☐ Nurse (RN and RPN)
- ☐ Nurse Practitioner
- ☐ Occupational Therapist
- ☐ Personal Care Attendant (PCA)
- ☐ Pharmacist
- ☐ Pharmacy Technician
- ☐ Physician
- ☐ Physiotherapist
- ☐ Psychologist
- ☐ Social Worker
- ☐ Spiritual Care Giver
- ☐ Therapeutic Recreation
- ☐ Vocational Services
- ☐ Other

Please read before proceeding to the following questions:

Electronic Health Record (EHR): EHR refers to the future state of electronic integration of all components of the patient care record including provider entered documentation, computerized-provider order entry, and lab results viewer. Specifically, EHR represents the planned implementation of the Meditech 6.0 product.

5. Do you use a personal computer (PC) or PC device (such as laptop or handheld device) to access the following? **(Select all that apply)**

- ☐ Patient's medical information
- ☐ Your email
- ☐ Health/clinical resources, journals and/or research
- ☐ Other (please specify):

_____

6. Which of the following best describes your use of the current HCS System technology available to view transcribed reports and patient registration information? **(Select all that apply)**

- ☐ Use the HCS System frequently in my work
- ☐ Use the HCS System infrequently (occasionally) in my work.
- ☐ Have used the HCS System in the past, but I am not using it currently in my work.
- ☐ Have never used the HCS System in my work.

7. What experience do you have with electronic health records (EHR) in other healthcare facilities? **(select one)**

- ☐ Was involved with the implementation of EHR in another facility
- ☐ Was present for the implementation of EHR in another facility
- ☐ Have used EHR in another facility
- ☐ Have **never** used EHR in another facility

8. What training or experience with computers have you had? (select all that apply)

- ☐ Computer course taken in school
- ☐ Formal workshop or training in computers
- ☐ Self-guided learning about computers
- ☐ None

9. In an average week, how often do you use a computer?

- ☐ 1-5 times a week
- ☐ 6-10 times a week
- ☐ 11+ times a week
- ☐ I do not use a computer

10. On the whole, how sophisticated a computer user do you consider yourself? (select one)

- ☐ Novice - beginner with limited skills; requires assistance with email and/or Literature searches
- ☐ Basic general skills - advanced beginner; able to use basic functions of email and word processor and perform literature searches.
- ☐ Advanced general skills - starting to become well-rounded, knowledgeable, can perform more advanced lit searches, create PowerPoint presentations, use spreadsheets
- ☐ Advanced Skills – Able to use the computer to solve complex problems; comfortable using new software and technology, able to customize programs to meet needs
- ☐ Expert – Formal training in computers with ability to program in some Languages

11. How skilled are you at typing on a computer keyboard? (select one)

- ☐ Type with one finger on one hand only
- ☐ Type with one finger on both hands
- ☐ Type with multiple fingers on both hands but type slower than I write.
- ☐ Type with multiple fingers on both hands and type as quickly as I can write
- ☐ Type with multiple fingers on both hands and type more quickly than I can write

12. How frequently do you dictate notes for transcription? (select one)

- ☐ Never
- ☐ Rarely (1X/month or less)
- ☐ Occasionally (1X/month – 1X/week)
- ☐ Frequently (1X/week – 1X/day)
- ☐ Very frequently (more than 1X/day)

Management Support

The following questions ask you to rate your **expectation of** management's support (including physician leadership) in EHR implementation and your organizational climate.

1. The EHR project is important to top management.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

2. The EHR project will be introduced to me effectively by management.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

3. Management will do an effective job during the implementation of the EHR.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

4. Management will involve me in the implementation of the EHR.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

5. Management will provide me with the training that I need in order to use the EHR effectively.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

6. I will have easy access to resources to help me in understanding and using the EHR.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

7. Management expects me to use the EHR.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

Your Involvement

In the following questions you are asked to rate your **expectation of** involvement during the implementation phase of the EHR project.

1. My involvement during the EHR implementation phase is a must.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

2. My involvement during the EHR implementation phase will be effective.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

3. My involvement during the EHR implementation phase will make the EHR more useful to me.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

4. My involvement during the EHR implementation phase will make the EHR easier to be used.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

5. Overall, my involvement during the EHR implementation phase will positively affect my attitude about using the EHR.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

Adequate Training

The following questions ask you to give your opinion **(expectation)** about the training you **will** receive on how to use the EHR.

1. The training I will receive on the EHR will be adequate.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

2. I will receive the training that I need to be able to understand and use the EHR.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

3. The EHR training will make it more useful to me.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

4. The EHR training will make it easier for me to use this technology.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

5. EHR training is essential for all staff that will be using the EHR.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

Your Autonomy

The following questions ask you to give your opinion about your autonomy.

1. Using the EHR will increase the **hospital administration's** ability to control and monitor my clinical practices and decision-making.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

2. Using the EHR **may** threaten my personal and professional privacy.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

3. Using the EHR **may** result in legal or ethical problems for me.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

4. Using the EHR **may** limit my autonomy in making clinical decisions or judgments.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

5. Overall, my attitude about using the EHR **may be** negatively affected as a result of the increased control and monitoring of my clinical practices and decision-making.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

6. Overall, my attitude about using the EHR **may be** negatively affected as a result of the security, legal and/or ethical concerns associated with using the EHR.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

Healthcare Worker-Patient Relationship

In the following questions you are asked to give your opinion about the healthcare worker-patient relationship.

1. The patient's confidence **will likely be** diminished if the patient sees me using computer-based technology as a diagnostic aid.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

2. Using the EHR **will likely** threaten my credibility with the patients.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

3. Using the EHR **will likely** reduce the patient's satisfaction with the quality of health care he/she receives.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

4. Overall, using the EHR **will likely** interfere with the effectiveness of the health care professional and patient interaction.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

Perceived Ease of Use

Based on your expectation, the following questions are asked to rate how easy the EHR **will be** to use.

1. My interaction with the EHR will be clear, understandable, and "user-friendly".

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

2. Learning to use the EHR will be easy for me.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

3. I expect to become skilled at using the EHR.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

4. Overall, I expect the EHR will be easy for me to use.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

5. I would like to become skilled at using the EHR.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

Perceived Usefulness

Based on your expectation, the following questions are asked to give your opinion about how useful the EHR will be to you and to the health care system.

1. Using the EHR will improve the quality of my work in providing better patient care.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

2. Using the EHR will improve communication between clinicians.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

3. Using the EHR will improve patient safety.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

4. Using the EHR will give me greater control over my work schedule.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

5. Using the EHR will allow me to accomplish tasks more quickly.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

6. Using the EHR will allow me to accomplish more work than would otherwise be possible.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

7. Using the EHR will enhance my overall effectiveness in my job.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

8. Using the EHR will make my job easier to perform.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

9. Overall, the EHR should be a useful tool for practicing my profession.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

Attitude about EHR Usage

Based on your expectation, the following questions are asked to give your opinion about EHR usage and acceptance.

1. The development and implementation of the EHR technology will support me in providing better patient care.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

2. I will encourage the use of the EHR among my colleagues.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

3. I need the EHR technology to provide effective patient care.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

4. I am **not satisfied** with using the paper-based patient record in my job.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

5. All staff should learn to use the EHR effectively.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

6. Overall, my attitude about EHR usage **will be** positive.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

7. Coherent and comprehensive patient records will be easily accessible.

Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
1	2	3	4	5

Comments

1. How important is it for you to be able to access the EHR off-site or from home?

Very Important		Somewhat Important		Not at all important
1	2	3	4	5

2. How useful would it be for you to have tablet computers available to enter/access EHR information at the patient's bedside?

Very useful		Somewhat useful		Not at all useful
1	2	3	4	5

3. How useful would it be for you to have other mobile technology available (examples: iphone/blackberry) to enter/access EHR information?

Very useful		Somewhat useful		Not at all useful
1	2	3	4	5

4. How useful would it be for you to have other mobile technology available (iphone/blackberry) to communicate with other care providers?

Very useful		Somewhat useful		Not at all useful
1	2	3	4	5

5. Regarding EHR training, how do you learn best? (Select only one)

- ☐ Group setting
- ☐ One on one tutorial
- ☐ On-line or electronic self-guided tutorial
- ☐ Other (please specify)

Additional comments:

6. Regarding EHR training, do you have any suggestions on how management should organize workshops and training modules?

7. In your opinion, what role do you feel management (including physician leadership) plays in the EHR system implementation?

8. In your opinion, do you feel *the healthcare workers within* Ontario Shores are in consensus regarding their attitudes towards EHR adoption? (Select only one)

- ☐ Yes
- ☐ Don't know
- ☐ No (please explain)

9. In your opinion, do you feel *executives* within Ontario Shores are in consensus regarding their attitudes towards EHR adoption? (Select only one)

- ☐ Yes
- ☐ Don't know
- ☐ No (please explain)

10. Is there a process that you or another team member performs that could be automated, which would aid in making the process flow more efficient or increase the patients' quality of care?

11. Please use this section to provide any additional comments or suggestions regarding the usage and acceptance of the EHR. These comments will help us better understand your responses overall and may suggest other questions that need to be addressed in the build and implementation of the EHR at Ontario Shores.

Thank you for your participation. If you have any questions or concerns please contact Amardeep (Nina) Joshi at 416.402.4578 or Amardeep.joshi@uoit.ca.

Appendix B – Criteria for survey design

Table 11

Criteria Used to Ensure Quality of Research Design

Criteria (Obtained from Cooper & Schindler, 2003)	**Survey Design Choices**	**Disadvantages**	**Measures Taken to Reduce Disadvantages**
Costs	The choice to provide an online survey for this case study was due to the potential of 800+ participants; it was the most cost efficient.	Converting surveys to the web can become expensive	Faculty resources and technical skills were available to build the survey online.
Sample Accessibility	The pool of participants included clinicians such as physicians, nurses and allied health professionals. Due to their responsibilities with providing patient care their time is limited. Therefore, using a self-administered survey that is available online at any time was best suited for the participant's schedules so that they could access it on their own time.	If any issues arise in accessing online surveys, participants may not report it or may get frustrated and not complete the survey.	To avoid these issues the survey was tested with different internet browsers.
Careful Consideration	The survey was designed so it could be completed in segments, the user had the option to save its responses and come back at another time to complete it. This relieved any pressure the participant may feel to complete it in one sitting and avoided any rushed answers.	The user may not come back after starting it. Depending on how long the user takes to complete the survey in relation to the time line of the study their responses may have become influenced by other activities over time.	
Topic Coverage	A general known rule of thumb is to keep the surveys less than 10 minutes to complete. This survey was designed to be completed within 10-15minutes to ensure the participant was willing to complete it.	A known limitation of self-administered surveys is the type and amount of information that can be collected, as researchers cannot probe deeply into the topics.	Having the survey designed to be saved and restarted was also to influence the users willingness to complete the survey.

Anonymity	Anonymity was enhanced by providing online surveys and by eliminating any questions that would identify the individuals.	Couldn't track the attitudes over time based on individuals.	
Nonresponse Error	Self-administered online surveys were chosen.	Nonresponse errors are a major weakness of self-administered surveys as its very easy for participants to not participate; this is often seen with mail surveys.	To address this an online survey was provided so participants didn't have an additional step of mailing it back. Furthermore in order to reduce the nonresponse error, the following techniques were used: reminders, anonymity, letter of invitation and memo.

Appendix C - Ethics Approval from UOIT

RESEARCH ETHICS BOARD

Date: June 25, 2010
To: Amardeep (Nina) Joshi (Graduate Student), Dr. Ilan Fischler (Co-PI), Dr. Jennifer Percival (Supervisor) and Dr. Carolyn McGregor (Supervisor)
From: Raymond Cox, REB Chair
File #: 09-116
Title: Clinicians attitudes regarding the implementation of an electronic health record (EHR) at a tertiary care mental health centre

The University of Ontario Institute of Technology Research Ethics Board has reviewed the above research proposal. The application in support of the above research project has been reviewed by the Research Ethics Board to ensure compliance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS) and the UOIT Research Ethics Policy and Procedures.

DECISION: APPROVED

COMMENTS AND CONDITIONS:

This project has been approved for the period of **June 25, 2010 until June 25, 2011** subject to full REB ratification at the Research Ethics Board's next scheduled meeting. The approval may be extended upon request.

Please note that the Research Ethics Board (REB) requires that you adhere to the protocol as last reviewed and approved by the REB. The Board must approve any modifications before they can be implemented. If you wish to modify your research project, please contact REB Administration, to obtain the Change Request Form.

Adverse or unexpected events must be reported to the REB as soon as possible with an indication of how these events affect, in the view of the Principal Investigator, the safety of the participants and the continuation of the protocol.

If research participants are in the care of a health facility, a school, community organization or other institution it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the REB prior to the initiation of any research protocols.

Section F, Article 1.13, Review Procedures for Ongoing Research of the TCPS http://www.pre.ethics.gc.ca/english/policystatement/policystatement.cfm requires that ongoing research be monitored. A Final Report is required for all projects, with the exception of undergraduate projects, upon completion of the project. Researchers with projects lasting more than one year are required to submit a Renewal Request annually. Contact REB Administration to obtain a copy of the Renewal Request/Final Report form.

Please quote your REB file number on all future correspondence. Thank you.

REB Chair Dr. Raymond Cox, Faculty of Business & Information Technology Raymond.cox@uoit.ca	Sascha Tuuha, Compliance Officer 905 721 8668 ext. 3693 compliance@uoit.ca

Appendix D - Ethics Approval from the Tertiary Mental Health Centre

Research Ethics Board Office
Bldg 7 Level 2 Room-2043
Ontario Shores Centre for Mental Health Sciences
700 Gordon Street
Whitby, Ontario L1N 5S9
REBSubmissions@ontarioshores.ca
905-668-5881 ext. 6996

March 25, 2010

PRINCIPAL INVESTIGATOR:
Ms. Amardeep Joshi
Department of Clinical Informatics
University of Ontario Institute of Technology
2000 Simcoe Street North
Oshawa ON L1H 7K4

Dear Ms. Joshi,

RE: Ontario Shores REB # 010-001,

Study Title: "Clinicians attitudes regarding the implementation of an electronic health record (EHR) at a tertiary care mental health centre"

The above named submission has been reviewed and approved by the Ontario Shores Research Ethics Board for a period of one year from the date of this letter. If the study is expected to continue beyond the expiry date (See Footer below), you are responsible for ensuring the study receives re-approval. The REB must also be notified of the completion or termination of this study and a final report provided.

Documents Approved:

- Invitational Letter (Version 2) (Modified March 24th, 2010)
- Survey Memo (Version 2) (Modified March 24th, 2010)
- EHR Survey Final (Version 2) (Modified March 24th, 2010)

Documents Acknowledged:

- TAHSN Application (Modified January 14th, 2010)
- REB Changes for OS (Modified March 24th, 2010)

If, during the course of the research, there are any serious adverse events, changes in the approved protocol or consent form, or any new information that must be considered with respect to the study, these should be brought to the immediate attention of the Board. As the Principal Investigator, you are responsible for the ethical conduct of this study.

The Ontario Shores Research Ethics Board operates in compliance with the Tri-Council Policy Statement, ICH/GCP Guidelines and Part C, Division 5 of the Food and Drug Regulations of Health Canada.The signature below confirms our attestation to all information noted in the footer of this document.

Sincerely,

Dr. Ron Heslegrave, PhD
Chair, Ontario Shores Research Ethics Board

REB Review Type: Expedited
***Full Board Meeting Date: 2010- February-04**
***REB Initial Approval Date: 2010-March-25**
***REB Expiry Date: 2011-March-25**

Appendix E - Invitational Letter

Dear _____,

We are conducting a staff survey analyzing their attitudes and opinions about the electronic health record (EHR). The purpose of this research study is to develop a change process model to ensure the successful implementation and acceptance of an electronic health record, at a tertiary-care mental health center. The survey will be used to assess the attitudes of healthcare professionals, such as physicians, nurses and allied health, at various phases of the planning and implementation process.

Furthermore, current and future state models representing technology use and process flows of all units at the mental health center will be created by observational studies. The current state models will be then analyzed for inefficiencies; and the future state models will try to eliminate these inefficiencies.

Educational sessions will be held to address the common concerns identified from the survey results. It is presumed that the attitudes and opinions of participants towards EHRs will change as they become more educated. This in-turn will have a positive effect on the acceptance and successful implementation of the EHR. We are aiming to include clinicians as much as possible in the planning and pre-implantation process, so that they will have a greater satisfaction once the EHR goes live.

Given that extensive changes will be occurring due to the implementation of the new EHR, our team endorses the need for such a survey and the creation of process models, and we hope to recruit *your support* for this project.

Survey Details
The survey will comprise of generic questions regarding general attitudes regarding electronic documentation. The staff members can complete the survey online or on paper at their own convenience. These surveys will be completed in three phases.

Phase 1: Pre-intervention (before the educational session)
Phase 2: Post-intervention/pre-implementation (after the education session & before EHR implementation)
Phase 3: Post-implementation (after EHR implementation)

Modeling Details
The process models will be created by a researcher who will be observing your daily work processes. Once the models are completed they will be shared with you to ensure accuracy of data collection

Your Role

We would greatly appreciate it if you could encourage and notify all clinical staff members in your department of this study. All surveys will be voluntary and all information collected will be anonymous. We will be sending memos to your staff members within 2 weeks with instructions on how to access the survey (see attached).

Ethics Related

This survey has been approved by the Research Ethics Board at Ontario Shores. We know of no harm that taking part in this study could cause you or other clinical staff. We, and the other research team members, have no conflict of interest to declare. New information that we obtain while we are doing this study may affect your decision to take part in this study. If this happens, we will tell you about this new information. And we will ask you again if you still want to be in the study.

The data produced from this study will be stored in a secure, locked location with restricted access. Only members of the research team will have access to the data. This could include external research team members. Published study results will not reveal your identity.

Thank you!

By providing a complete picture of the common concerns the clinical staff of Ontario Shores may have will allow us to improve the implementation process and identify any barriers the staff may be facing. If you or any other staff member has any questions or concerns you can contact Nina (Amardeep Joshi) at (416) 402-4578 or email her at amardeep.joshi@uoit.ca.

We thank you in advance for your participation and look forward to sharing a summary of our results with you.

Yours sincerely,

Amardeep (Nina) Joshi
Graduate Student, Clinical Informatics
University of Ontario Institute of Technology
(416) 402-4578

Carolyn McGregor PhD
CRC in Health Informatics
University of Ontario Institute of Technology
(905) 721-8668 ext. 3697

Jennifer Percival PhD
Faculty of Business & IT
University of Ontario Institute of Technology
(905) 721-8668 ext. 2833

Dr. Ilan Fischler
Special Services Program
Ontario Shores Center for Mental Health Sciences

Appendix F - Memo

To: All Clinical Staff Members
From: Amardeep (Nina) Joshi
Re: Survey opportunity

We want your opinions on the electronic health records

We are conducting a clinical staff paper and online survey analyzing attitudes and opinions about the electronic health record (EHR).

The survey will be used to assess the attitudes of healthcare professionals, such as physicians, nurses and allied health, at various phases of the planning and implementation process. Once we learn your concerns and issues we will hold educational sessions that will help prepare you better for the implementation of the EHR and to support your transition. The greater amount of input we gather, the more we will be able to ensure your satisfaction when the EHR goes live.

The surveys will be available online at www.hir.uoit.ca/ontarioshores or in paper format, which will be dropped off in the next couple of days. Participation is voluntary and all responses will be anonymous. Given that extensive changes will be occurring due to the implementation of the new EHR, our team endorses the need for such a survey, and we hope to recruit *your support* of this project.

If you have any questions or concerns please do not hesitate to call Nina at 416.402.4578, or email her at Amardeep.joshi@uoit.ca.

Appendix G – Questions Supporting Figure 24

Category	Questions Used
Autonomy	Overall, my attitude about using the EHR may be negatively affected as a result of the increased control and monitoring of my clinical practices and decision-making
Worker-patient relationship	Using the EHR will improve the quality of my work in providing better patient care
	Using the EHR will improve patient safety
Ease of use	Overall, I expect the EHR will be easy for me to use
Perceived usefulness	Overall, the EHR should be a useful tool for practicing my profession
Attitudes toward EHRs	Overall, my attitude about EHR usage is or will be positive

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Total	**Total Responses**	**140**		**36**		**72**	
Gender	Female	96	69%	25	69.44%	49	68.06%
	Male	29	21%	8	22.22%	15	20.83%
	No Answer	15	11%	3	8.33%	8	11.11%
Age	<30 years	19	14%	2	5.56%	5	6.94%
	30-39 years	46	33%	9	25.00%	21	29.17%
	40-49 years	31	22%	6	16.67%	19	26.39%
	50-59 years	25	18%	12	33.33%	11	15.28%
	>60 years	9	6%	5	13.89%	8	11.11%
	No Answer	10	7%	2	5.56%	8	11.11%
Role	Physician (1)	18	13%	6	16.67%	8	11.11%
	Nurse (RN and RPN) (2)	50	36%	19	52.78%	42	58.33%
	Clinical Nutritionist (3)	3	2%	1	2.78%	0	0.00%
	Social Worker (4)	13	9%	1	2.78%	0	0.00%
	Physiotherapist (5)	2	1%	0	0.00%	0	0.00%
	Occupational Therapist (7)	9	6%	0	0.00%	0	0.00%
	Pharmacist (8)	3	2%	0	0.00%	4	5.56%
	Spiritual Care Giver (9)	1	1%	0	0.00%	2	2.78%
	Personal Care Attendant (PCA) (10)	2	1%	0	0.00%	0	0.00%
	Clerical (11)	1	1%	0	0.00%	0	0.00%
	Nurse Practitioner (12)	1	1%	0	0.00%	2	2.78%
	Psychologist (13)	0	0%	0	0.00%	1	1.39%
	Pharmacy Technician (14)	0	0%	0	0.00%	0	0.00%
	Lab Technician (15)	0	0%	0	0.00%	0	0.00%
	Diagnostic Imaging Technician (16)	0	0%	1	2.78%	1	1.39%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Role	Child Youth Worker (17)	2	1%	1	2.78%	1	1.39%
	Therapeutic Recreation (18)	8	6%	4	11.11%	4	5.56%
	Vocational Services (19)	13	9%	3	8.33%	1	1.39%
	Rehab Therapist	3	2%	0	0.00%	1	1.39%
	Other (look at next sheet)	7	5%	0	0.00%	1	1.39%
	No answer	4	3%	0	0.00%	4	5.56%
# of years working in healthcare	Less than 5 years (a)	26	19%	4	11.11%	11	15.28%
	5 - 10 years (b)	33	24%	7	19.44%	10	13.89%
	11 - 15 years (c)	20	14%	7	19.44%	10	13.89%
	More than 15 years (d)	49	35%	17	47.22%	35	48.61%
	No answer	12	9%	1	2.78%	6	8.33%
In which setting do you primarily practice	Inpatient (a)	106	63%	33	84.62%	59	80.82%
	Outpatient (on-site) (b)	30	18%	4	10.26%	5	6.85%
	Outpaitent (off-site) (c)	26	15%	2	5.13%	8	10.96%
	Both in & out	3	2%	0	0.00%	0	0.00%
	Other (look at next sheet)	3	2%	0	0.00%	1	1.37%
What area/department do you primarily work in?	Vocational Services (1)	12	9%	3	8.33%	1	1.39%
	Special Services (2)	20	14%	11	30.56%	19	26.39%
	Assessment/Reintegration (ARP) (3)	16	11%	6	16.67%	9	12.50%
	Forensics (FACT) (4)	14	10%	2	5.56%	16	22.22%
	Adolescents (ADOL) (5)	11	8%	7	19.44%	3	4.17%
	Special Population (6)	8	6%	2	5.56%	6	8.33%
	Integrated Health Services (IHS) (7)	10	7%	3	8.33%	2	2.78%
	Other	20	14%	2	5.56%	7	9.72%
	No answer	29	21%	0	0.00%	9	12.50%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Do you use a personal computer (PC) or PC device (such as a laptop or handheld device) to access the following?	Patient's medical information (a)	84	60%	na		18	13.95%
	Your email/internet (b)	129	92%	na		62	48.06%
	Health/clinical resources, journals and/or research (c)	101	72%	na		47	36.43%
	Other (look at next sheet)	13	9%	na		2	1.55%
Which of the following best describes your use of the current HCS System Technology available to view transcribed reports and patient registration information?	Use the HCS frequently in my	50	36%	na		na	
	Use the HCS infrequently (occasionally) in my work (b)	43	31%	na		na	
	Have used the HCS in the past, but I am not using it currently in my work (c)	16	11%	na		na	
	Have never used the HCS in my work (d)	18	13%	na		na	
	No answer	13	9%	na		na	
What experience do you have with electronic health records (EHR) in other healthcare facilities?	Was involved with the implementation of an EHR in another facility (a)	3	2%	0	0.00%	6	8.33%
	Was present for the implementation of an EHR in another facility (b)	5	4%	1	2.78%	4	5.56%
	Have used an EHR in another facility (c)	45	32%	4	11.11%	25	34.72%
	Have never used an EHR in another facility (d)	74	53%	24	66.67%	29	40.28%
	No answer	13	9%	7	19.44%	8	11.11%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
What training or experience with computers have you had?	Computer course taken in school (a)	51	24%	na		22	20.75%
	Formal workshop or training in computers (b)	56	26%	na		30	28.30%
	Self-guided learning about computers (e)	100	47%	na		50	47.17%
	None (f)	6	3%	na		4	3.77%
In an average week, how often do you use a computer?	1-5 times a week (a)	7	5%	na		2	2.78%
	6-10 times a week (b)	18	13%	na		5	6.94%
	11+ times a week (c)	108	77%	na		58	80.56%
	I do not use a computer (d)	0	0%	na		1	1.39%
	No answer	7	5%	na		6	8.33%
On the whole, how sophisticated a computer user do you consider yourself?	Novice - beginner with limited skills; requires assistance with email and/or Literature searches (a)	6	4%	9	25.00%	5	6.94%
	Basic general skills - advanced beginner; able to use basic functions of email and word processor and perform literature searches (b)	50	36%	13	36.11%	32	44.44%
	Advanced general skills - starting to become well-rounded, knowledgeable, can perform more advanced literature searches, create powerpoint presentations, and use spreadsheets (c)	76	54%	13	36.11%	30	41.67%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
On the whole, how sophisticated a computer user do you consider yourself?	Expert - formal training in computers with ability to program in some languages (d)	4	3%	1	2.78%	0	0.00%
	No answer	4	3%	0	0.00%	5	6.94%
How skilled are you at typing on a computer keyboard?	Type with one finger on one hand only (a)	7	5%	na		3	4.17%
	Type with one finger on both hands (b)	14	10%	na		12	16.67%
	Type with multiple fingers on both hands but type slower than I write (c)	34	24%	na		21	29.17%
	Type with multiple fingers on both hands and type as quickly as I can write (d)	37	26%	na		12	16.67%
	Type with multiple fingers on both hands and type more quickly than I can write (e)	44	31%	na		17	23.61%
	No answer	4	3%	na		7	9.72%
How frequently do you dictate notes for transcription?	Never (a)	92	66%	na		44	61.11%
	Rarely (once a month or less) (b)	12	9%	na		5	6.94%
	Occasionally (once a week to once a month) (c)	9	6%	na		5	6.94%
	Frequently (once a day to once a week) (d)	13	9%	na		8	11.11%
	Very Frequently (more than once a day) (e)	2	1%	na		0	0.00%
	No answer	12	9%	na		10	13.89%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Management Support Questions							
The EHR project is important to top management	Strongly Disagree (a)	0	0%	na		0	0.00%
	Disagree (b)	4	3%	na		1	1.54%
	Neither Agree/Disagree (c)	3	2%	na		5	7.69%
	Agree (d)	60	43%	na		12	18.46%
	Strongly Agree (e)	54	39%	na		42	64.62%
	Don't Know (f)	8	6%	na		1	1.54%
	No answer	11	8%	na		4	6.15%
The EHR project will be introduced to me effectively by management	Strongly Disagree (a)	1	1%	na		5	6.94%
	Disagree (b)	9	6%	na		5	6.94%
	Neither Agree/Disagree (c)	21	15%	na		5	6.94%
	Agree (d)	73	52%	na		27	37.50%
	Strongly Agree (e)	16	11%	na		18	25.00%
	Don't Know (f)	8	6%	na		1	1.39%
	No answer	12	9%	na		11	15.28%
Management will do an effective job in the technical implentation of the EHR	Strongly Disagree (a)	2	1%	na		5	6.94%
	Disagree (b)	9	6%	na		7	9.72%
	Neither Agree/Disagree (c)	20	14%	na		10	13.89%
	Agree (d)	73	52%	na		24	33.33%
	Strongly Agree (e)	14	10%	na		13	18.06%
	Don't Know (f)	7	5%	na		2	2.78%
	No answer	15	11%	na		11	15.28%
Management will involve me in the implementation of the EHR	Strongly Disagree (a)	10	8%	na		2	3.28%
	Disagree (b)	10	8%	na		10	16.39%
	Neither Agree/Disagree (c)	20	16%	na		11	18.03%
	Agree (d)	61	48%	na		22	36.07%
	Strongly Agree (e)	18	14%	na		16	26.23%
	Don't Know (f)	8	6%	na		0	0.00%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Management will provide me with training that I need in order to use the EHR effectively	Strongly Disagree (a)	1	1%	na		5	6.94%
	Disagree (b)	6	4%	na		6	8.33%
	Neither Agree/Disagree (c)	8	6%	na		5	6.94%
	Agree (d)	85	61%	na		29	40.28%
	Strongly Agree (e)	24	17%	na		17	23.61%
	Don't Know (f)	5	4%	na		0	0.00%
	No answer	11	8%	na		10	13.89%
I will have easy access to resources to help me in understanding and using the EHR	Strongly Disagree (a)	1	1%	na		4	5.56%
	Disagree (b)	6	4%	na		7	9.72%
	Neither Agree/Disagree (c)	25	18%	na		11	15.28%
	Agree (d)	73	52%	na		19	26.39%
	Strongly Agree (e)	20	14%	na		21	29.17%
	Don't Know (f)	2	1%	na		0	0.00%
	No answer	13	9%	na		10	13.89%
Management expects me to use the EHR	Strongly Disagree (a)	0	0%	na		0	0.00%
	Disagree (b)	1	1%	na		0	0.00%
	Neither Agree/Disagree (c)	2	1%	na		0	0.00%
	Agree (d)	47	34%	na		15	20.83%
	Strongly Agree (e)	73	52%	na		43	59.72%
	Don't Know (f)	3	2%	na		3	4.17%
	No answer	14	10%	na		11	15.28%
Your involvement during the implementation phase of the EHR							
My involvement during the EHR implementation phase is a must	Strongly Disagree (a)	3	2%	na		1	1.39%
	Disagree (b)	8	6%	na		7	9.72%
	Neither Agree/Disagree (c)	8	6%	na		6	8.33%
	Agree (d)	58	41%	na		20	27.78%
	Strongly Agree (e)	45	32%	na		22	30.56%
	Don't Know (f)	4	3%	na		2	2.78%
	No answer	14	10%	na		14	19.44%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
My involvement during the EHR implementation phase will increase my knowledge about the EHR	Strongly Disagree (a)	0	0%	na		2	2.78%
	Disagree (b)	3	2%	na		4	5.56%
	Neither Agree/Disagree (c)	8	6%	na		7	9.72%
	Agree (d)	75	54%	na		22	30.56%
	Strongly Agree (e)	38	27%	na		24	33.33%
	Don't Know (f)	2	1%	na		0	0.00%
	No answer	14	10%	na		13	18.06%
My involvment during the EHR implementation phase will make the EHR more useful to me	Strongly Disagree (a)	0	0%	na		2	2.78%
	Disagree (b)	4	3%	na		7	9.72%
	Neither Agree/Disagree (c)	10	7%	na		5	6.94%
	Agree (d)	62	44%	na		22	30.56%
	Strongly Agree (e)	45	32%	na		23	31.94%
	Don't Know (f)	3	2%	na		0	0.00%
	No answer	16	11%	na		13	18.06%
My involvement during the EHR implementation phase will make the EHR easier for me to use	Strongly Disagree (a)	0	0%	na		2	2.78%
	Disagree (b)	1	1%	na		5	6.94%
	Neither Agree/Disagree (c)	7	5%	na		9	12.50%
	Agree (d)	72	51%	na		21	29.17%
	Strongly Agree (e)	43	31%	na		22	30.56%
	Don't Know (f)	2	1%	na		0	0.00%
	No answer	15	11%	na		13	18.06%
Overall, my involvment during the EHR implementaion phase will positively affect my attitude about using the EHR	Strongly Disagree (a)	0	0%	na		4	5.56%
	Disagree (b)	4	3%	na		3	4.17%
	Neither Agree/Disagree (c)	19	14%	na		7	9.72%
	Agree (d)	58	41%	na		21	29.17%
	Strongly Agree (e)	38	27%	na		23	31.94%
	Don't Know (f)	5	4%	na		1	1.39%
	No answer	16	11%	na		13	18.06%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Adequate Training							
The training I will receive on the EHR will be adequate	Strongly Disagree (a)	2	1%	na		5	6.94%
	Disagree (b)	5	4%	na		6	8.33%
	Neither Agree/Disagree (c)	26	19%	na		5	6.94%
	Agree (d)	57	41%	na		31	43.06%
	Strongly Agree (e)	16	11%	na		10	13.89%
	Don't Know (f)	13	9%	na		0	0.00%
	No answer	21	15%	na		15	20.83%
I will receive sufficient training in order to understand and use the EHR	Strongly Disagree (a)	2	1%	na		5	6.94%
	Disagree (b)	4	3%	na		6	8.33%
	Neither Agree/Disagree (c)	22	16%	na		3	4.17%
	Agree (d)	61	44%	na		32	44.44%
	Strongly Agree (e)	16	11%	na		11	15.28%
	Don't Know (f)	14	10%	na		0	0.00%
	No answer	21	15%	na		15	20.83%
The EHR training will make it easier for me to use this technology	Strongly Disagree (a)	0	0%	na		5	6.94%
	Disagree (b)	4	3%	na		0	0.00%
	Neither Agree/Disagree (c)	12	9%	na		6	8.33%
	Agree (d)	65	46%	na		31	43.06%
	Strongly Agree (e)	33	24%	na		15	20.83%
	Don't Know (f)	6	4%	na		0	0.00%
	No answer	20	14%	na		15	20.83%
The EHR training will make the EHR more useful to me	Strongly Disagree (a)	0	0%	na		6	8.33%
	Disagree (b)	4	3%	na		2	2.78%
	Neither Agree/Disagree (c)	12	9%	na		5	6.94%
	Agree (d)	70	50%	na		28	38.89%
	Strongly Agree (e)	28	20%	na		16	22.22%
	Don't Know (f)	6	4%	na		0	0.00%
	No answer	20	14%	na		15	20.83%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
EHR training is essential for all staff who will be using the EHR	Strongly Disagree (a)	0	0%	na		0	0.00%
	Disagree (b)	0	0%	na		0	0.00%
	Neither Agree/Disagree (c)	3	2%	na		2	2.78%
	Agree (d)	34	24%	na		23	31.94%
	Strongly Agree (e)	64	46%	na		32	44.44%
	Don't Know (f)	2	1%	na		0	0.00%
	No answer	37	26%	na		15	20.83%
I would have like longer EHR training sessions (this question is only in the phase 3 survey)	Strongly Disagree (a)	na		na		2	2.78%
	Disagree (b)	na		na		7	9.72%
	Neither Agree/Disagree (c)	na		na		16	22.22%
	Agree (d)	na		na		14	19.44%
	Strongly Agree (e)	na		na		16	22.22%
	Don't Know (f)	na		na		1	1.39%
	No answer	na		na		16	22.22%
I would have liked shorter EHR training sessions (this question is only in the phase 3 survey	Strongly Disagree (a)	na		na		14	19.44%
	Disagree (b)	na		na		20	27.78%
	Neither Agree/Disagree (c)	na		na		11	15.28%
	Agree (d)	na		na		6	8.33%
	Strongly Agree (e)	na		na		3	4.17%
	Don't Know (f)	na		na		1	1.39%
	No answer	na		na		17	23.61%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
I was able to access effective assistance during the EHR implementation (this question is only in the phase3 survey)	Strongly Disagree (a)	na		na		2	2.78%
	Disagree (b)	na		na		3	4.17%
	Neither Agree/Disagree (c)	na		na		10	13.89%
	Agree (d)	na		na		17	23.61%
	Strongly Agree (e)	na		na		19	26.39%
	Don't Know (f)	na		na		4	5.56%
	No answer	na		na		17	23.61%
My Autonomy							
Using the EHR will increase the hospital administration's ability to control and monitor my clinical practices and decision making	Strongly Disagree (a)	1	1%	0	0.00%	2	2.78%
	Disagree (b)	9	6%	2	5.56%	7	9.72%
	Neither Agree/Disagree (c)	24	17%	16	44.44%	16	22.22%
	Agree (d)	49	35%	14	38.89%	14	19.44%
	Strongly Agree (e)	27	19%	2	5.56%	16	22.22%
	Don't Know (f)	8	6%	0	0.00%	1	1.39%
	No answer	22	16%	2	5.56%	16	22.22%
Using the EHR may threaten my personal and professional privacy	Strongly Disagree (a)	11	8%	0	0.00%	9	12.50%
	Disagree (b)	52	37%	13	36.11%	26	36.11%
	Neither Agree/Disagree (c)	30	21%	15	41.67%	10	13.89%
	Agree (d)	12	9%	3	8.33%	5	6.94%
	Strongly Agree (e)	3	2%	2	5.56%	2	2.78%
	Don't Know (f)	9	6%	1	2.78%	4	5.56%
	No answer	23	16%	2	5.56%	16	22.22%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Using the EHR may result in legal or ethical problems for me	Strongly Disagree (a)	8	6%	0	0.00%	11	15.28%
	Disagree (b)	58	41%	15	41.67%	33	45.83%
	Neither Agree/Disagree (c)	29	21%	9	25.00%	4	5.56%
	Agree (d)	11	8%	7	19.44%	3	4.17%
	Strongly Agree (e)	2	1%	1	2.78%	1	1.39%
	Don't Know (f)	10	7%	2	5.56%	2	2.78%
	No answer	22	16%	2	5.56%	18	25.00%
Using the EHR may limit my autonomy in making clinical decisions or judgements	Strongly Disagree (a)	9	6%	0	0.00%	10	13.89%
	Disagree (b)	55	39%	18	50.00%	27	37.50%
	Neither Agree/Disagree (c)	27	19%	11	30.56%	7	9.72%
	Agree (d)	10	7%	4	11.11%	6	8.33%
	Strongly Agree (e)	2	1%	1	2.78%	1	1.39%
	Don't Know (f)	12	9%	0	0.00%	4	5.56%
	No answer	25	18%	0	0.00%	17	23.61%
Overall, my attitude about using the EHR may be negatively affected as a result of the increased control and monitoring of my clinical practices and decision-making	Strongly Disagree (a)	5	4%	2	5.56%	8	11.11%
	Disagree (b)	54	39%	13	36.11%	32	44.44%
	Neither Agree/Disagree (c)	25	18%	12	33.33%	9	12.50%
	Agree (d)	16	11%	6	16.67%	3	4.17%
	Strongly Agree (e)	4	3%	1	2.78%	1	1.39%
	Don't Know (f)	11	8%	0	0.00%	2	2.78%
	No answer	25	18%	2	5.56%	17	23.61%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Overall, my attitude about using the EHR may be negatively affected as a result of the security, legal and/or ethical concerns associated with using the EHR	Strongly Disagree (a)	7	5%	2	5.56%	8	11.11%
	Disagree (b)	47	34%	14	38.89%	31	43.06%
	Neither Agree/Disagree (c)	31	22%	11	30.56%	10	13.89%
	Agree (d)	14	10%	4	11.11%	3	4.17%
	Strongly Agree (e)	2	1%	2	5.56%	1	1.39%
	Don't Know (f)	13	9%	1	2.78%	2	2.78%
	No answer	26	19%	2	5.56%	17	23.61%
Worker-Patient Relationship							
The patient's confidence will likely be diminished if the patient sees me using computer-based technology as a diagnostic aid	Strongly Disagree (a)	9	6%	0	0.00%	6	8.33%
	Disagree (b)	57	41%	19	52.78%	23	31.94%
	Neither Agree/Disagree (c)	32	23%	9	25.00%	9	12.50%
	Agree (d)	7	5%	4	11.11%	10	13.89%
	Strongly Agree (e)	3	2%	1	2.78%	1	1.39%
	Don't Know (f)	8	6%	1	2.78%	4	5.56%
	No answer	24	17%	2	5.56%	19	26.39%
Using the EHR will likely threaten my credibility with my patients	Strongly Disagree (a)	15	11%	1	2.78%	9	12.50%
	Disagree (b)	58	41%	20	55.56%	28	38.89%
	Neither Agree/Disagree (c)	25	18%	8	22.22%	8	11.11%
	Agree (d)	6	4%	4	11.11%	4	5.56%
	Strongly Agree (e)	2	1%	1	2.78%	1	1.39%
	Don't Know (f)	10	7%	0	0.00%	3	4.17%
	No answer	24	17%	2	5.56%	19	26.39%
Using the EHR will likely reduce the patient's satisfaction with the quality of health care he/she receives	Strongly Disagree (a)	13	9%	2	5.56%	6	8.33%
	Disagree (b)	50	36%	20	55.56%	25	34.72%
	Neither Agree/Disagree (c)	24	17%	2	5.56%	7	9.72%
	Agree (d)	13	9%	9	25.00%	6	8.33%
	Strongly Agree (e)	4	3%	1	2.78%	6	8.33%
	Don't Know (f)	11	8%	0	0.00%	4	5.56%
	No answer	25	18%	2	5.56%	18	25.00%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Overall, using the EHR will likely interfere with the effectiveness of the health care profesional and patient interactions	Strongly Disagree (a)	11	8%	2	5.56%	6	8.33%
	Disagree (b)	50	36%	16	44.44%	26	36.11%
	Neither Agree/Disagree (c)	27	19%	6	16.67%	7	9.72%
	Agree (d)	11	8%	8	22.22%	6	8.33%
	Strongly Agree (e)	7	5%	1	2.78%	6	8.33%
	Don't Know (f)	10	7%	0	0.00%	2	2.78%
	No answer	24	17%	3	8.33%	19	26.39%
Ease of use							
My interaction with the EHR will be clear, understandable, and "user-friendly"	Strongly Disagree (a)	3	2%	2	5.56%	7	9.72%
	Disagree (b)	11	8%	5	13.89%	7	9.72%
	Neither Agree/Disagree (c)	29	21%	7	19.44%	9	12.50%
	Agree (d)	52	37%	17	47.22%	27	37.50%
	Strongly Agree (e)	5	4%	1	2.78%	4	5.56%
	Don't Know (f)	14	10%	2	5.56%	0	0.00%
	No answer	26	19%	2	5.56%	18	25.00%
Learning to use the EHR will be easy for me	Strongly Disagree (a)	4	3%	5	13.89%	3	4.17%
	Disagree (b)	11	8%	8	22.22%	10	13.89%
	Neither Agree/Disagree (c)	28	20%	3	8.33%	10	13.89%
	Agree (d)	47	34%	11	30.56%	24	33.33%
	Strongly Agree (e)	10	7%	6	16.67%	8	11.11%
	Don't Know (f)	15	11%	1	2.78%	0	0.00%
	No answer	25	18%	2	5.56%	17	23.61%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
I expect to become skilled at using the EHR	Strongly Disagree (a)	1	1%	2	5.56%	5	6.94%
	Disagree (b)	3	2%	3	8.33%	7	9.72%
	Neither Agree/Disagree (c)	11	8%	7	19.44%	4	5.56%
	Agree (d)	69	49%	11	30.56%	29	40.28%
	Strongly Agree (e)	29	21%	11	30.56%	10	13.89%
	Don't Know (f)	2	1%	0	0.00%	0	0.00%
	No answer	25	18%	2	5.56%	17	23.61%
I would like to become skilled at using the EHR	Strongly Disagree (a)	2	1%	2	5.56%	na	
	Disagree (b)	3	2%	0	0.00%	na	
	Neither Agree/Disagree (c)	4	3%	2	5.56%	na	
	Agree (d)	47	34%	16	44.44%	na	
	Strongly Agree (e)	40	29%	14	38.89%	na	
	Don't Know (f)	1	1%	0	0.00%	na	
	No answer	43	31%	2	5.56%	na	
Overall, I expect the EHR will be easy for me to use	Strongly Disagree (a)	0	0%	1	2.78%	5	6.94%
	Disagree (b)	6	4%	5	13.89%	8	11.11%
	Neither Agree/Disagree (c)	20	14%	8	22.22%	5	6.94%
	Agree (d)	54	39%	10	27.78%	29	40.28%
	Strongly Agree (e)	20	14%	8	22.22%	8	11.11%
	Don't Know (f)	14	10%	2	5.56%	0	0.00%
	No answer	26	19%	2	5.56%	17	23.61%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Perceived usefulness							
Using the EHR will improve the quality of my work in providing better patient care	Strongly Disagree (a)	0	0%	0	0.00%	5	6.94%
	Disagree (b)	11	8%	5	13.89%	9	12.50%
	Neither Agree/Disagree (c)	38	27%	8	22.22%	10	13.89%
	Agree (d)	44	31%	16	44.44%	18	25.00%
	Strongly Agree (e)	9	6%	4	11.11%	10	13.89%
	Don't Know (f)	10	7%	1	2.78%	3	4.17%
	No answer	28	20%	2	5.56%	17	23.61%
Using the EHR will improve communication between clinicians	Strongly Disagree (a)	0	0%	0	0.00%	3	4.17%
	Disagree (b)	4	3%	2	5.56%	4	5.56%
	Neither Agree/Disagree (c)	17	12%	4	11.11%	11	15.28%
	Agree (d)	56	40%	20	55.56%	21	29.17%
	Strongly Agree (e)	26	19%	7	19.44%	15	20.83%
	Don't Know (f)	9	6%	1	2.78%	1	1.39%
	No answer	28	20%	2	5.56%	17	23.61%
Using the EHR will improve patient safety	Strongly Disagree	1	1%	0	0.00%	2	2.78%
	Disagree	7	5%	2	5.56%	6	8.33%
	Neither Agree/Disagree	29	21%	7	19.44%	10	13.89%
	Agree	41	29%	17	47.22%	20	27.78%
	Strongly Agree	17	12%	7	19.44%	12	16.67%
	Don't Know	16	11%	1	2.78%	5	6.94%
	No answer	29	21%	2	5.56%	17	23.61%
Using the EHR will give me greater control over my work schedule	Strongly Disagree (a)	5	4%	0	0.00%	9	12.50%
	Disagree (b)	22	16%	4	11.11%	9	12.50%
	Neither Agree/Disagree (c)	50	36%	17	47.22%	19	26.39%
	Agree (d)	15	11%	10	27.78%	9	12.50%
	Strongly Agree (e)	2	1%	2	5.56%	7	9.72%
	Don't Know (f)	17	12%	1	2.78%	2	2.78%
	No answer	29	21%	2	5.56%	17	23.61%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Using the EHR will allow me to accomplish tasks more quickly	Strongly Disagree (a)	6	4%	3	8.33%	10	13.89%
	Disagree (b)	13	9%	2	5.56%	10	13.89%
	Neither Agree/Disagree (c)	34	24%	11	30.56%	7	9.72%
	Agree (d)	35	25%	14	38.89%	17	23.61%
	Strongly Agree (e)	9	6%	4	11.11%	11	15.28%
	Don't Know (f)	15	11%	0	0.00%	0	0.00%
	No answer	28	20%	2	5.56%	17	23.61%
Using the EHR will allow me to accomplish more work than would otherwise be possible	Strongly Disagree (a)	6	4.29%	4	11.11%	9	12.50%
	Disagree (b)	17	12.14%	3	8.33%	11	15.28%
	Neither Agree/Disagree (c)	41	29.29%	13	36.11%	13	18.06%
	Agree (d)	20	14.29%	9	25.00%	10	13.89%
	Strongly Agree (e)	8	5.71%	5	13.89%	11	15.28%
	Don't Know (f)	20	14.29%	0	0.00%	1	1.39%
	No answer	28	20.00%	2	5.56%	17	23.61%
Using the EHR will enhance my overall effectiveness in my job	Strongly Disagree (a)	4	3%	1	2.78%	6	8.33%
	Disagree (b)	11	8%	6	16.67%	11	15.28%
	Neither Agree/Disagree (c)	34	24%	6	16.67%	10	13.89%
	Agree (d)	40	29%	17	47.22%	17	23.61%
	Strongly Agree (e)	6	4%	4	11.11%	9	12.50%
	Don't Know (f)	17	12%	0	0.00%	2	2.78%
	No answer	28	20%	2	5.56%	17	23.61%
Using the EHR will make my job easier to perform	Strongly Disagree (a)	7	5%	3	8.33%	7	9.72%
	Disagree (b)	12	9%	1	2.78%	12	16.67%
	Neither Agree/Disagree (c)	36	26%	12	33.33%	10	13.89%
	Agree (d)	31	22%	13	36.11%	15	20.83%
	Strongly Agree (e)	9	6%	3	8.33%	9	12.50%
	Don't Know (f)	16	11%	1	2.78%	1	1.39%
	No answer	29	21%	3	8.33%	18	25.00%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Interprofessional documentation has become more clinically useful, easier to read and more accessible in the electronic environment	Strongly Disagree (a)	na		na		2	2.78%
	Disagree (b)	na		na		3	4.17%
	Neither Agree/Disagree (c)	na		na		5	6.94%
	Agree (d)	na		na		28	38.89%
	Strongly Agree (e)	na		na		17	23.61%
	Don't Know (f)	na		na		0	0.00%
	No answer	na		na		17	23.61%
Overall, the EHR should be a useful tool for practicing my profession	Strongly Disagree (a)	2	1%	0	0.00%	3	4.17%
	Disagree (b)	3	2%	2	5.56%	3	4.17%
	Neither Agree/Disagree (c)	27	19%	8	22.22%	8	11.11%
	Agree (d)	54	39%	16	44.44%	25	34.72%
	Strongly Agree (e)	13	9%	7	19.44%	15	20.83%
	Don't Know (f)	12	9%	1	2.78%	1	1.39%
	No answer	29	21%	2	5.56%	17	23.61%
Attitudes on EHR usage							
The development and implementation of the EHR technology will support me in providing better patient care	Strongly Disagree (a)	3	2%	1	2.78%	5	6.94%
	Disagree (b)	4	3%	2	5.56%	5	6.94%
	Neither Agree/Disagree (c)	32	23%	7	19.44%	13	18.06%
	Agree (d)	50	36%	23	63.89%	20	27.78%
	Strongly Agree (e)	8	6%	1	2.78%	10	13.89%
	Don't Know (f)	11	8%	0	0.00%	1	1.39%
	No answer	32	23%	2	5.56%	18	25.00%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
I will encourage the use of the EHR among my colleagues	Strongly Disagree (a)	0	0%	1	2.78%	2	2.78%
	Disagree (b)	4	3%	3	8.33%	1	1.39%
	Neither Agree/Disagree (c)	20	14%	4	11.11%	5	6.94%
	Agree (d)	60	43%	14	38.89%	28	38.89%
	Strongly Agree (e)	18	13%	12	33.33%	18	25.00%
	Don't Know (f)	4	3%	0	0.00%	0	0.00%
	No answer	34	24%	2	5.56%	18	25.00%
I need the EHR technology to provide effective patient care	Strongly Disagree (a)	8	6%	5	13.89%	2	2.78%
	Disagree (b)	17	12%	7	19.44%	6	8.33%
	Neither Agree/Disagree (c)	31	22%	9	25.00%	17	23.61%
	Agree (d)	33	24%	11	30.56%	17	23.61%
	Strongly Agree (e)	9	6%	2	5.56%	11	15.28%
	Don't Know (f)	9	6%	0	0.00%	1	1.39%
	No answer	33	24%	2	5.56%	18	25.00%
I am not satisfied with using the paper-based patient record at my job	Strongly Disagree (a)	3	2%	3	8.33%	2	2.78%
	Disagree (b)	20	14%	10	27.78%	7	9.72%
	Neither Agree/Disagree (c)	29	21%	7	19.44%	18	25.00%
	Agree (d)	33	24%	12	33.33%	11	15.28%
	Strongly Agree (e)	20	14%	2	5.56%	12	16.67%
	Don't Know (f)	2	1%	0	0.00%	0	0.00%
	No answer	33	24%	2	5.56%	22	30.56%
Coherent and comprehensive patient records will be easily accessible	Strongly Disagree (a)	0	0%	0	0.00%	4	5.56%
	Disagree (b)	1	1%	0	0.00%	4	5.56%
	Neither Agree/Disagree (c)	17	12%	2	5.56%	4	5.56%
	Agree (d)	42	30%	20	55.56%	31	43.06%
	Strongly Agree (e)	22	16%	12	33.33%	11	15.28%
	Don't Know (f)	9	6%	0	0.00%	0	0.00%
	No answer	49	35%	2	5.56%	18	25.00%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
All staff should learn to use the EHR effectively	Strongly Disagree (a)	0	0%	0	0.00%	0	0.00%
	Disagree (b)	1	1%	0	0.00%	0	0.00%
	Neither Agree/Disagree (c)	15	11%	5	13.89%	2	2.78%
	Agree (d)	48	34%	8	22.22%	22	30.56%
	Strongly Agree (e)	43	31%	20	55.56%	28	38.89%
	Don't Know (f)	1	1%	0	0.00%	1	1.39%
	No answer	32	23%	2	5.56%	19	26.39%
Overall, my attitude about EHR usage is or will be positive	Strongly Disagree (a)	0	0%	1	2.78%	4	5.56%
	Disagree (b)	3	2%	1	2.78%	1	1.39%
	Neither Agree/Disagree (c)	18	13%	5	13.89%	4	5.56%
	Agree (d)	55	39%	15	41.67%	24	33.33%
	Strongly Agree (e)	26	19%	12	33.33%	20	27.78%
	Don't Know (f)	3	2%	0	0.00%	1	1.39%
	No answer	35	25%	2	5.56%	18	25.00%
Overall, use of the EHR has improved my enjoyment of my clinical practice	Strongly Disagree (a)	na		na		5	6.94%
	Disagree (b)	na		na		5	6.94%
	Neither Agree/Disagree (c)	na		na		11	15.28%
	Agree (d)	na		na		18	25.00%
	Strongly Agree (e)	na		na		14	19.44%
	Don't Know (f)	na		na		1	1.39%
	No answer	na		na		18	25.00%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
General questions							
How important is it for you to be able to access the EHR off-site or from home?	NOT AT ALL USEFUL (1) (a)	26	19%	21	58.33%	10	13.89%
	(2) (b)	14	10%	2	5.56%	4	5.56%
	SOMEWHAT USEFUL (3) (c)	24	17%	4	11.11%	2	2.78%
	(4) (d)	14	10%	1	2.78%	4	5.56%
	EXTREMELY USEFUL (5) (e)	20	14%	5	13.89%	12	16.67%
	Don't Know (f)	6	4%	1	2.78%	11	15.28%
	No answer	36	26%	2	5.56%	29	40.28%
How usefull would it be for you to have tablet computers available to enter/access EHR information at the patient's bedside?	NOT AT ALL USEFUL (1) (a)	27	19%	6	16.67%	7	9.72%
	(2) (b)	20	14%	2	5.56%	2	2.78%
	SOMEWHAT USEFUL (3) (c)	20	14%	12	33.33%	10	13.89%
	(4) (d)	6	4%	5	13.89%	7	9.72%
	EXTREMELY USEFUL (5) (e)	24	17%	7	19.44%	8	11.11%
	Don't Know (f)	7	5%	1	2.78%	7	9.72%
	No answer	36	26%	3	8.33%	31	43.06%
How useful would it be for you to have other mobile technology available (examples: iphone/blackberry) to enter/access EHR information?	NOT AT ALL USEFUL (1) (a)	34	24%	8	22.22%	7	9.72%
	(2) (b)	13	9%	7	19.44%	1	1.39%
	SOMEWHAT USEFUL (3) (c)	24	17%	9	25.00%	8	11.11%
	(4) (d)	10	7%	3	8.33%	4	5.56%
	EXTREMELY USEFUL (5) (e)	17	12%	5	13.89%	20	27.78%
	Don't Know (f)	5	4%	1	2.78%	11	15.28%
	No answer	37	26%	3	8.33%	21	29.17%
How useful would it be for you to have other mobile technology available (Exampels: iphone/blackberry) to communicate with other care providers?	NOT AT ALL USEFUL (1) (a)	28	20%	7	19.44%	7	9.72%
	(2) (b)	14	10%	4	11.11%	1	1.39%
	SOMEWHAT USEFUL (3) (c)	23	16%	7	19.44%	3	4.17%
	(4) (d)	11	8%	8	22.22%	7	9.72%
	EXTREMELY USEFUL (5) (e)	18	13%	6	16.67%	24	33.33%
	Don't Know (f)	8	6%	1	2.78%	8	11.11%
	No answer	38	27%	3	8.33%	22	30.56%

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Regarding EHR training, how do you learn best?	Group setting (1)	70	43%	na		40	55.56%
	One on one tutorial (2)	39	24%	na		17	23.61%
	On-line or electronic self-guided tutorial (3)	45	28%	na		14	19.44%
	Other (next sheet)	9	6%	na		6	8.33%
Regarding EHR training, do you have any suggestions on how management should organize workshops and training modules?	Answer (next sheet)	33	24%	na		na	
	No answer	107	76%	na		na	
Regarding EHR training that was provided, do you have any suggestions or comments on how the training was set up	Answer (next sheet)	na		na		29	40.28%
	No answer	na		na		43	59.72%
In your opinion, what role do you feel management (including physician leadership) plays in the EHR system	Answer (look at next sheet)	39	28%	na		na	
	No answer	101	72%	na		na	
In your opinion, do you feel executives with Ontario Shores are in consensus regarding their attitudes towards EHR adoption?	Yes (1)	39	28%	na		na	
	Don't Know (2)	57	41%	na		na	
	Other (next sheet)	4	3%	na		na	
	No answer	40	29%	na		na	
In your opinion, do you feel the healthcare workers within Ontario Shores are in consensus regarding their attitudes towards EHR adoption?	Yes (1)	21	15%	17	47.22%	na	
	Don't Know (2)	59	42%	14	38.89%	na	
	Other (next sheet)	20	14%	2	5.56%	na	
	No answer	40	29%	3	8.33%	na	

Appendix H - Phase 1, 2, 3 Results

Question	Options	Phase 1	Phase 1 Percentage	Phase 2	Phase 2 Percentage	Phase 3	Phase 3 Percentage
Is there a process that you or another team member performs that could be automated; which would aid in making the process flow more efficient or increase the patients' quality of care?	Answer (next sheet)	18	13%	1	2.78%	na	
	No answer	122	87%	35	97.22%	na	
Please use this section to provide any additional comments or suggestions regarding the usage and acceptance of the EHR. These comments will help us better understand your responses overall and may suggest other questions that need to be addressed in the build and implementation of the EHR at Ontario Shores.	Answer (next sheet)	28	20%	10	27.78%	na	
	No answer	112	80%	26	72.22%	na	
Please use this section to provide any additional comments or suggestions regarding the implementation, usage and acceptance of the EHR.	Answer (next sheet)	na		na		23	31.94%
	No answer	na		na		49	68.06%

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Role	Other		Manager Nutrition & Food
	CI Analyst		Rehabilitation Therapist
	Mgmt		APN
	Therapeutic Recreation		Advanced Practice Nurse
	Clinical Manager		
	Rehab Therapist		
	Rehab Therapist		
	Transitional Case Manager		
	student		
	Dental Assistant		
In which setting do you primarily practice	Rehabilitation Therapist		Clinical Informatics
	outpt-on and off site		
	Neither		
	Support Services		
	both		
	education		
	both in and out pt		
	Day Treatment		
What area/department do you primarily work in?	float pool		Clinical Informatics
	nursing relief pool		REACH
	float pool		NRP
	Out-Patients		Support Services
	Nursing Relief Pool		Pharmacy
	CI		ICAP
	Occupational Health		Clinical Informatics
	Central Recreation		
	Clinical Informatics		
	adult upgrading-literacy		
	Centre Wide		
	ICAP		
	ICAP		
	ICAP		
	facilty wide		
	REACH		
	ICAP		
	ACTT		
	Pharmacy		
	ADOL/ARP/FACT		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Do you use a personal computer (PC) or PC device (such as a laptop or handheld device) to access the following?	word processing		charting/labs at other hospitals in the USA
	intranet		no
	Intranet		
	gambling		
	INTRA		
	Typr own reports		
	professional practice		
	writing reports, payroll, incident reports, etc.		
	internet		
	calendar, programs		
	nothing written		
	internet		
	nothing written		
	nothing written		
	browsing		
	Life Lab		
	CPS		
	Psych Reports		
Regarding EHR training, how do you learn best?	practice		Have not learned yet.
	hands on learning		minimal training
	Practice		Once on ward actual usage
	within clinical practice/setting		No choice given for learning. Training provided in lecture style format. Hands on and repetition works best for me for this type of training.
	repitition!		hands on
	visual learner		practice
	practice		
	Very small group settings		
	nothing written		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Regarding EHR training that was provided, do you have any suggestions or comments on how the training was set up?			need another session after implementation to learn advance features that were not covered in initial training, could address questions clinicians have that came to light once using EHR
			We had a session about improvements for EHR after it was implemented and some of these changes were not made. Maybe 2 follow up sesssions to ensure changes are made would be beneficial.
			Training was excellent - the instructors were fabulous!
			I wish I had more basic computer training prior to being trained on the EHR.
			no
			group passive observation is not an effective learning modality. p/s set up group commputer labs. for future educational sessions.
			More 1:1 training
			hands on lab would be the best method.
			would have liked access to train on my own after receiving the formal training
			too much to take in leaving you on a working shift learning the rest with the pts all amused and angry at the lack of staff.
			Too much to take in in such a short period of time
			Would have liked more training prior to the implementation of the EHR
			Training was very helpful. The set up was very conducive to my learning style.
			cross training essential
			Should have a refresher after 3 months of use. Peer to peer audits to ensure we are all using it the same way.
			no
			The only training provided thus far for out-patient clinicians was a one hour lecture on how to sign off on a dictacted note and a hour session on entering workload. Anything else to do with the EHR I have had to learn on my own or seek out other staff to show me. Out-patients does not currently use the EHR and is not expected to until later in 2011. This survey asks most of the questions are about using the EHR and what attitudes you have developed as a result. This is confusing since out-patients currently does not use it as an EHR so I think most answers from this survey would not be useful to any researcher.

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Regarding EHR training that was provided, do you have any suggestions or comments on how the training was set up?			I was one of the trainers so when we did our training we were really learning as we went. However I found that helpful in seeing concerns in test that we could fix before golive
			Too much delay from training to implementation (> 30days)
			small groups seemed to work best
			Loved that the trainors were actual nurses in the hospital. I have never seen this before-usually trainors who know the system but can\'t relate it to the hosptial\'s practice/patient care.
			Repeat sessions to be arranged after EHR has been used for a period of time. This would be an opportunity to ask the right qeations.
			nursing concerns not dealt wiht;policies still reflect old system;no assistance post implementation
			The staff who have used meditech in other facilities were really distracting the new learners.
			The programs are not always logical, ie. needing to select which med time is to be give and med strength or dose.
			Too basic. Not all aspects to maintain safe practices for patient safety were implemented.
			I felt this was the best roll out and education of a new initive at Ontario Shores that I have ever participated in. The on ward support during the first two go live weeks made all the difference to my success.
			The guided practice led by a Project EASIER CEL was a great way to learn.
			More time was needed on an individual basis on the computer on the units.
Regarding EHR training, do you have any suggestions on how management should organize workshops and training modules?	Extra sessions for people who feel they are struggling.		
	more time for training		
	1/3 of the units at a time so that it will not leave the staff short handed		
	Hands on training with guidance from superusers and instructors. Small groups to facilitate greater learning.		
	Allowing staff to have time to use test patients and ask questions about using Meditech		
	They should have computers this year. Last year they didn\'t.		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Regarding EHR training, do you have any suggestions on how management should organize workshops and training modules?	In different ways at different times. On the intra, at the cafeteria, leaving the classrooms open. Short bits of information, frequently, Bulletins		
	Go through a typical day using EHR with discipline-specific patient load as well as other interdisciplinary activities ie. MAPs meetings, kardex, etc.		
	MORE INTERACTIVE SESSIONS ARE NEEDED		
	more resources for one on one tutorial		
	because I will not be implementing the new knowledge for about a year I personally would appreciate a refresher		
	no		
	constant support until a few fully trained		
	As more training is needed		
	within disciplines		
	They should organize monthly workshops, or one-on-one support in the staff members unit/area, once implementation complete to ensure proper usage.		
	seemed to have worked well during are go live although we did recognize that there is always room for improvement. well thought out process.		
	offer ongoing support - including evenings		
	hands-on practice and clinical scenarios		
	Hands on practice and handouts		
	group professions together (ie: nursing together, managers as another group) as their questions will be similar and they will learn from each other		
	Continue to offer refresher training and/or opportunities to present questions/suggestions		
	make it easy for us		
	n/a		
	The online tutorials should allow you to accesss info in bits currently you have to go from start to finish if I have an issue with an item I would like electroic resource to get knowedge like micrsoft help		
	Provide options for different ways of learning (perhaps all of the above listed). Some staff may benefit more from one-on-one tutorials or an online tutorial rather than listening to a speaker/presentation in a group.		
	VERY small group settings (4-5 people)		
	patience and support in helping to organize files.		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Regarding EHR training, do you have any suggestions on how management should organize workshops and training modules?	they should be ongoing as learning is a process and happens over time, which in and of itself gives birth to new or different questions...		
	Online tutorials would be helpful.		
	I should be allowed to get extra training if I need it.		
	I would like to have additional training sessions if I need them.		
	drop in sessions would be helpful		
In your opinion, what role do you feel management (including physician leadership) plays in the EHR system implementation?	Providing adequate training.		
	it was their decision to go this route, not front line staff		
	Large role as all staff will need to be on board and mentor each other. Front line staff will adapt to technology and the expectation should be that physician\'s and management are on board also. The team should work together to mentor and assist one another		
	buy-in and share enthusiasm. they are leaders here and others look to them to set the tone.		
	Physicians will need to be on top of their work, ie. med orders so everyone else can do their work		
	It is imperative that they learn the system so that they may act as role models for thier staff.		
	They should be role models, super users and champions.		
	The physicians need to take the workshops.		
	Supportive, ensure ample opportunity for learning and practicing new system and enforce adherence to policies and best practice, provide technical resources and equipment to facilitate EHR		
	Listen to the clinicians regarding challenges of time/learning curve regarding the system and that it is not intuitive regarding headings/formatting, etc. Mgmt also should do some test runs of what a typical charting day is like so that they can have a sense of workload with this system.		
	MONEY AND FACILITY		
	being supportive and patient		
	allow attendance at refresher courses, and ongoing education and support		
	I don\'t know		
	give support if necessary		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
In your opinion, what role do you feel management (including physician leadership) plays in the EHR system implementation?	They play a big role as physicians need to do electronic order entry. As some physicians are not pleased with the the new system, there may be some \'blanks\' or inconsistentcies in patient info.		
	Everyone in the organization has a role, in order to implement the EMR in an effective positive manner. That being said it is important that leadership from the top be invovled from Physician to nursing, social work etc. Yes it is important.		
	To provide support to all staff		
	Providing guidance, adequate training for staff, and opportunity for staff to provide feedback on the EHR system and implementation process.		
	Ensuring that it is implemented and that staff know how to use it		
	They are the leaders and should encourage this. They should also speak positively to motivate staff. They need to lead by example.		
	How well they themselves are able to use the system can either limit or increase the overall use of the system.		
	Must have enough equipment for all staff to use		
	Important to be positive role models.		
	they need to input their own orders and follow through the same as the nurses with no exceptions		
	having adequate timely help available		
	Let the Clinicians who do the work make decisions		
	Assuring that staff have all the required equipment and tools in advance of going live.		
	Physicians need to have adequate support available quickly for questions or problems that arise.		
	HUGE.		
	very important to be able to access patients file so that I can be up to date with consultations and Lab results and ongoing Assessment and monitoring of risk and safety issues with my patients.		
	They should be more knowledgeable.		
	Ensuring information sharing between EHR developers and clinical staff. Providing support for training and transition to EHR.		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
In your opinion, what role do you feel management (including physician leadership) plays in the EHR system implementation?	Engage physician for input into order sets, training provision.		
	Try to have groups but let people self select groups they are going to be in depending on computer and typing skills they have. With 1-1 available if they need it.		
	Needs to provide training that is effective.		
	Helping to develop and implement it.		
	I have no idea. I have heard nothing from them. I don't know their involvement/role.		
	Very Important. Physicians clearly understand the importance of clinical records. Accessing Records in a timely fashion.		
In your opinion, do you feel executives with Ontario Shores are in consensus regarding their attitudes towards EHR adoption?	some are too far removed from front line practice and have never practised at this centre		
	Some don\'t seem involved		
	haven\'t a clue		
	some express their frustration		
In your opinion, do you feel the healthcare workers within Ontario Shores are in consensus regarding their attitudes towards EHR adoption?	some are worried, some are excited	nothing written	
	varying views	There is variation in how people feel, as some are not really aware of what is upcoming.	
	Some feel that the implementation will be messed up.		
	I think some oare positive and some are negative		
	there are many staff dreading ehr use as they are not computer proficient		
	Generally there is always resistance		
	I think it may differ depending on individual experiences and feelings of competence re:computer usage		
	Those lacking computer skills may lack confidence and fear EHR--particularly older staff		
	people resist change!!!		
	Change can be more difficult for some than others		
	mixed feelings		
	Some workers are more prepared to learn new technology than others based on experience/knowledge of technology and computers.		
	some people have difficulty with change.		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
	as it causes more task oriented work which takes you away from client and clinical time		
	some people are resistant to change in general and using newer technology specifically		
	people are confused and worried, especially the older staff		
	nothing written		
	nothing written		
	nothing written		
Is there a process that you or another team member performs that could be automated; which would aid in making the process flow more efficient or increase the patients' quality of care?	Automatically recording vital signs to the database.	I still don\'t know until I\'ve given this a true trial and see what\'s missing	
	Intake process-outpatient Charting/assessments-to stream line and have flowsheets to minimize so much of the narrative charting		
	referrals		
	Entering data for assessments into the system rather than writing it down and then entering it later.		
	Lets get into it and see where it goes		
	Receiving patient referrals, booooking intake app\'ts, using the EHR to schedule regular groups/meetings so that these are reflected within the patients EHR so staff are aware of app\'ts and can avert any time conflicts. Currently I use the outlook calendar to schedule app\'ts with patients and send an electronic message to nurse facilitator to put this into a scheduling book. Way to many steps involved and this should be incorporated into EHR as well as any other clinic app\'ts both internally and externally. (I understand this is not available on the Meditech system). Also there needs to be a way to send follow up or reminder messages to clinicians about patient appointments.		No. Too much time in front of a computer. There\'s something to be said about having time to sit with a patient and just speak. They have all identified it as the top form of treatment, and yet we seem to downplay this aspect...We need to be spending more time speaking with clients. That is where \"quality\" mental status exams take place. this is where you can really determine probabilities around risk, etc...
	INFORMATION SHOULD NOT BE DUPLICATED		
	the progress notes for patient care		
	work load utomatically populate or be captured after assessment are completed.		
	Unique templates used by each program		
	many		
	A form of recording while having a 1:1 with a patient, so no information is lost or misunderstood.		
	no		
	tablet loaded with audit programs that could be uploaded		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Is there a process that you or another team member performs that could be automated; which would aid in making the process flow more efficient or increase the patients quality of care?	Currently have to enter external lab results manually, which is very time consuming. Perhaps HIM should be doing this.		
	Intervention flow sheets and/or checklists for daily/weekly interventions completed with each client.		
	community connections with health care providers		
	No. Too much time in front of a computer. There\'s something to be said about having time to sit with a patient and just speak. They have all identified it as the top form of treatment, and yet we seem to downplay this aspect...We need to be spending more time speaking with clients. That is where \"quality\" mental status exams take place. this is where you can really determine probabilities around risk, etc...		
Please use this section to provide any additional comments or suggestions regarding the usage and acceptance of the EHR. These comments will help us better understand your responses overall and may suggest other questions that need to be addressed in the build and implementation of the EHR at Ontario Shores.	There will be a lot of negitivity initally while people adapt to the new system, hopefully however it will eventually allow nurses more time to spend with their patients.	The long delayed roll outs are difficult for those of us working with both in patients and out patients. We still have to maintain both systems even though we may be proficent in the new system.	
	Ensure adequate training and assistance. Provide staffing levels that are adequate for the go-live dates.	I am learning a lot of new things but I am still nervous.	
	Perhaps more input on development of system from front line staff.	The présentation on the benefits of the new system was helpful.	
	Hand held units for Out-Patients will be necessary for the Nurses	I have a better comprehension of the usefulness of having electronic records, but I am not fast with computers.	
	It\'s coming like it or not. Let\'s make the most of it!	Difficult to answer some of the questions without aeeing the format	
	Need to ensure that supports are in place 24/7 for technical (equipment) failure, password problems and access issues.	The presentation was very helpful. I felt ver well informed after.	

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Please use this section to provide any additional comments or suggestions regarding the usage and acceptance of the EHR. These comments will help us better understand your responses overall and may suggest other questions that need to be addressed in the build and implementation of the EHR at Ontario Shores.	I would also like to be able to track trends and from what I saw in Meditech this was cumbersome and didn\'t really show me a visual graph for trending.	I really appreciated the presentation that showed the maps of how things are to how they would be.	
	IT SHOULD BE BRIEF AND PRECISE, MOE TEMPLATES ARE NEEDED	Was good to see the maps of before and after the changes.	
	practice on a daily basis is very important	Demonstration was very informative. Well done!	
	will there be an electronic avenue to ask questions and seek out support as we work through the system	I am thankful for the demonstration. It gave me some insight into te way things would change for the better	
	I feel in all that the introduction of the EMR has been a positive for our organization taking us out of the dark ages , to being leaders in health care. It is very refreshing to be a positive part of this progression.		
	I\'m not sure yet as I haven\'t received the training and not sure how the EHR effects practice or our clients		
	- The 1000 character limit in text boxes is at times insufficient.		
	no		
	do not like recall nursing assesssments should not be recalled and this function is not conducive to good practice		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Please use this section to provide any additional comments or suggestions regarding the usage and acceptance of the EHR. These comments will help us better understand your responses overall and may suggest other questions that need to be addressed in the build and implementation of the EHR at Ontario Shores.	I was part of the pilot for outpatient services launched in October. There have been many headaches, as it became apparent that the focus had been placed on inpatient needs with little consideration given to the unique needs of outpatient: - point of care documentation when off- site - multiple mnemonics for patient accounts, resulting in wrong accounts being selected - delay in changing account status once client seen for first time, making point of care documentation impossible - once technology was in place to document off site, frequently the technology does not work. This requires us to use paper chart and find time the next day to re-do all documentation. - Entering home medications and labs manually is tedious and time consuming, whereas it does not create an issue for inpatients, as all labs are done internally and meds are entered by pharmacy.		
	I am concerned my training will be inadequate as it has been in other areas (i.e. meditech, mapping) and it costs me more time catching up.		
	Introdution of Best practice guidlines to help in the standardization of care,		
	Overall, I am very pleased with the EHR and intend to continue my support verbally and through my active participation. I do think that there are discipline specific needs that have gotten lost in the implementation. It does not matter how, but it is crucial to do something that does not compromise the integrity or College standards through which a discipline may be held accountable through. That requires all colleagues being respectful with some of distinctions and \"curve balls\" that may cause to standardization. Also, in making things, efficient, you have to look at the whole picture. Not just a little part of it...		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Please use this section to provide any additional comments or suggestions regarding the usage and acceptance of the EHR. These comments will help us better understand your responses overall and may suggest other questions that need to be addressed in the build and implementation of the EHR at Ontario Shores.	I think that in theory the EHR will have advantages over paper records but many processes within the Meditech program are counter-intuitive and potential for searching for specific documentation is far below my expectations prior to implementation. For example, I understood that we would be able to seach all documents or all documents within selected dates for a specific term such as \'pneumonia\' or to easily find specific specialists consult notes. As time goes by, the ability to locate specific items will become much more difficult than searching through paper casebooks where it is possible to visually identify the type or colour of paper etc.		
	I think the computers are going to slow me down as I will be on the computer all the time.		
	I know very little about the EHR - would like to know more, it seems like a good idea, everyone is doing it		
	Can\'t wait for the EHR		
	I have learned a lot about EHR\'s in school and am looking forward to it. It will be better than the paper system		
	Please, please, please ensure that there are enough tablets available to enter data right after seeing a ptient. any wait for access to these computers will SIGNIFICANTLY decrease my effieciency. I also need to be able to enter data DURING interviews when I do long interviews. Easy computer access is a MUST. I want to avoid a situation where I must wait for a computer. If this happens several times a day, the wasted time could add up quickly.		
	Can't wait for EHR!		
	I have gone to one session - learned nothing as had no prior info to what was going on. When did this happen? Who are you? HOw can you get in touch with me?		
	Access to clinical records is the key in my opionion is the no. 1 issue. Completing records in a quick way so other health care providers have knowledge of the care provided so far.		

Appendix H- Phase 1, 2, 3 Results-User Comments

	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Please use this section to provide any additional comments or suggestions regarding the implementation, usage and acceptance of the EHR.			generally happy with EHR and still learning, having access to information is very helpful, find it does take me more time to document however when I need to find information again it is much easier and time is saved
			I was concered that my resident notes (cosultation and discharge summaries) were signed off before I even viewed them. This was rectified but was concerning initially.
			The EHR has made my clincial practice better!
			Being that the computer was introduced to me for the EHR I feel confident now when working with computers.
			no
			mobile technology would be very helpful to make my job easier
			I am glad that I have previous exprerience with the electronic chart so that I could cope to a certain extent. There was absolutely no value in any belated training that was provided.
			trying to find information is chaotic. Communication amongst all care givers has reached a terrible low standard.
			Very little time is available for actual Pt care and or contact as staff have to spend far more of their day working on their computers/charts and making sure all their \"clocks\" are checked off. Pt/Staff interaction has decreased considerably as staff need to be in the office on computers catching up on demands of charts, ensuring everything is completed
			at times, trying to open patient charts, the compuer freeezes, requiring reloading. Other times, not letting staff in to read past notes
			I think we still have some opportunities to optimize the EHR but we are well on our way with what we already have!
			good system
			we need more training and Doctors need more training

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	1st Round Surveys	2nd Round Surveys	3rd Round Surveys
Question	**Responses**	**Responses**	**Responses**
Please use this section to provide any additional comments or suggestions regarding the implementation, usage and acceptance of the EHR.			As mentioned previously. The EHR has not been implemented as yet for out-patient use so it is confusing as to why we have been solicited to respond to this survey. There will be training provided for the implementation and this will help greatly. I have had to arrange my own training so that I can access information on the in-patient chart when I need to (for example if one of my patient\'s gets admitted to hospital). Trying to learn the system in an informal way is challenging. I also find the way the EHR is set up is not user friendly. There is lack of standardization which is very confusing. For example in screen you type in data and hit enter. In another screen you have to hit save after entering. Certain parts of the EHR are very idiosyncratic which makes the training more difficult and takes a longer time for the users to become familiar with and confident about using such a system.
			Cannot wait to have more population specifec data collection screens and assessment tools available on line.
			I would benefit from another education session which would help me recognise skills and defecits. I am ready to learn!!!!!
			the option of voice recognition soft ware would cut down the time I spent on typing the notes.
			staff feel comfortable using the \'worklist\' but would like some help on how to navigate the rest of the chart.
			Thought the go live support on units was bery valuable as well as super users.
			see above
			The flow sheets created for daily use were not user friendly.
			Minimal knowledge of ehr has been given to front line staff. Too many legal issues not covered for mental health ehr. I often wonder about the outcome if this was challenged in court does (soape) cover too little?
			I have since passed the Basic phase to some parts of the Advanced with creation of a powerpoint, I believe that part of your survey should be changed to include a sectio between Basic and Advanced.