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**DESCRIPTIONS OF NURSES' EXPERIENCES  
WITH ELECTRONIC HEALTH RECORDS (EHR):  
A PHENOMENOLOGICAL STUDY**

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WITH ELECTRONIC HEALTH RECORDS (EHR):  
A PHENOMENOLOGICAL STUDY**

**by**

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## **Dedication**

To my precious sons, Kevin and Ethan  
and  
To my beloved husband, Sam

## **Acknowledgments**

I would like to thank Dr. Judith C. Drew, the chair of my committee. As my mentor and coach, she has taught me more than I could give her credit for here. She has shown me, by her example, what a good researcher (and person) should be. I am grateful to each of the members of my Dissertation Committee that has provided me personal and professional guidance.

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**Descriptions of Nurses' Experiences**  
**With Electronic Health Records (EHR):**  
**A Phenomenological Study**

Publication No. \_\_\_\_\_

Anne S Liong, PhD

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Supervisor: Judith C Drew

The overall goal of this dissertation study was to explore and describe the lived experiences of nurses working with Electronic Health Records (EHR). Since U.S. President Bush's 2004 mandate to put EHRs in place by 2014, EHR design and implementation have become priorities for all health care organizations. Research studies of EHR implementation and utilization found in the literature reveal a fifty-percent failure rate among organizations and institutions that attempt to adopt and sustain EHR use in their facilities.

While nurses are the largest group of health care providers who use health information systems and can influence their adoption and utilization outcomes, few nurses have been included in planning, researching, and implementing the EHR. Several studies report nurses' uses of computers in the workplace, however few have examined the subjective lived experiences of nurses whose daily work is affected by organizational, technological, educational, and behavioral factors associated with EHR system conversion and implementation. The study reported here fills a gap in knowledge by adding the subjective lived experiences of EHR nurses to the larger body of knowledge that addresses information system changes and their influences upon nursing practice and patient care outcomes.

Using a phenomenology of practice research approach, a purposive sample of 14 nurses with EHR experiences was enrolled. Data were collected during interviews with the investigator until saturation and redundancy were achieved. Assigning code letters, interviewing participants in private places, and maintaining all study materials in locked files were methods used to protect identities and confidentiality. Interview data were transcribed, coded, and clustered during thematic analysis procedures guided by Martins (1992).

Findings revealed three emergent themes that captured the meanings of the participants' descriptions of *Phases of EHR Experiences*, *Dimensions of EHR Influence*, and *Future Improvements*. Twelve sub-themes supported by instances of data found in the narratives formed the knowledge used to induct the three themes. Truth value and scientific rigor of the study were evaluated using the standards of: (1) descriptive vividness, (2) methodological congruence, (3) analytical preciseness, (4) theoretical correctness, (5) heuristic relevance (Burns & Grove, 2005) and (6) Lincoln & Guba's (1985) criteria of trustworthiness.

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## **Chapter I: Introduction**

The purpose of this chapter is to present the problem that was investigated, explain its significance to the nursing profession, and discuss the contributions the findings are expected to make to the body of knowledge that guides change and innovation in health care organizations, especially those planning to implement the Electronic Health Record (EHR). The specific aims, research questions, overview of background and significance, introduction to the research approach employed, assumptions, and limitations are also discussed.

### **The Problem**

The Electronic Health Record (EHR) is a computerized clinical information system that stores and displays patient information in legible and organized ways, and facilitates the recording and retrieval of clinical information about patients. The EHR basically replaces the historically-used paper medical record that is most familiar to practitioners. The move to a paperless medical record is a daunting and expensive venture for health care providers and agencies. However, the U. S. Department of Health and Human Services has set a goal to meet President George W. Bush's mandate for EHRs to be in place nationally by the end of the next decade (Dearne, 2005). In his January 2004 State of the Union address, the President stated, "By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care" (Bush, 2004, para. 54).

In order to meet the President Bush's mandate, health care agencies are currently preparing to convert to EHR and some are already in the throws of conversions from either a paper-based system or from an existing computer-assisted clinical information system. Despite the large number of hospitals that have moved forward with attempts to conform to the President's directive, a staggering 50% have met with failure (Keil & Daniel, 2001; Lorenzi, 2000; Poulymenakou & Serafeimidia, 2004).

While several authors point out that nurses are instrumental to the successful adoption of new technologies in health care organizations (FitzHenry & Snyder, 1996; Lee, 2006), many of the failed EHR conversion efforts have been attributed to the

inclusion of too few nurses in planning and rolling out EHR changeovers (Keil & Daniel, 2001; Lorenzi, 2000). Based on reports in the literature, premises of change theories, and the reality that nurses are the primary users of health information systems, nurses' participation in planning, designing, and implementing EHR is essential to its success.

Nurses, as the largest group of in-hospital health care providers, use EHR or other clinical information systems 24-hours a day and have important contributions to make to the planning and successful implementation such a sweeping change. More nurses must be involved in these changes and more research needs to be conducted to discover how they interface with and evaluate the information systems they use day-in and day-out.

While there are a number of quantitative research studies that have surveyed nurses about their uses and opinions of EHR, only a few qualitative studies are reported in the literature. While survey data provide sound information, thick and rich descriptions of nurses' experiences with EHR and their interpretations of its effects on practice and patient care outcomes are still needed. The lack of qualitative research in this area suggests that nurses' subjective perspectives about use and efficacy of EHR are understudied and remain important to investigate in order to begin to fill gaps in knowledge.

### **Specific Aims and Research Question**

To address the identified gaps in knowledge, this study aimed to explore and describe the lived experiences of nurses working with the EHR at a major university medical center in the southwest United States. The target university medical center is comprised of six general and specialty hospitals, four professional health education colleges, and one humanities institute. The nurses employed there have a variety of educational backgrounds, years of nursing practice, and experiences with EHR. They were considered to be an appropriate population from which to draw a maximum variation sample required for qualitative studies like the one reported here.

While nurses frequently face the challenges of organizational and system changes in their work, learning a new system of documentation is a major task for nurses that are already preoccupied with patient care in a nursing shortage situation. Given these

challenges, as well as the organizational, technological, educational, and behavioral factors associated with system changes described in the literature, it is important that nurses' experiences are explored, described, and disseminated so that change-making in the clinical setting meets with success.

Although an increasing number of quantitative studies are being conducted to investigate interfaces between nurses and computer use, important questions pertaining to nurses' experiential nuances with system change, the challenges they face during implementation, and how they adapt to the changes need to be qualitatively captured and analyzed to fill gaps in knowledge about subjective perspectives about such changes. Therefore, the specific aims of the study were to:

1. understand the subjective transitional experiences of nurses working with EHRs as revealed by their stories about the conversion to a new electronic documentation system,
2. identify the challenges discussed in the stories about the documentation process and related changes in the workplace, and
3. describe strategies the nurses used to help them adapt

To achieve the aims of this study, a *phenomenology of practice* approach was used to answer the following research questions:

1. What are the lived experiences of nurses working with EHR?
2. How do nurses describe the influence EHR has on nursing practice and patient outcomes?
3. What factors do nurses describe as essential to EHR implementation and evaluation?

### **Summary of Background and Significance**

An EHR system is designed to improve patient safety, support the delivery of effective patient care, improve efficiency, and be feasibly implemented. Other goals are to preserve patient data longitudinally and avoid duplication across patient encounters with one or multiple health care providers. The Institute of Medicine published recommendations regarding EHR content that cover the general format of what EHRs

should include, as well as suggested a timetable for the progression of their development (IOM, 2003). More recently, the US Department of Health and Human Services (DHHS) asked the standards-writing organization known as Health Level 7 (HL7) to create a functional model for EHRs (Bates, 2004). This model provides standard criteria for EHRs that address clinical, administrative and infrastructure needs. Unfortunately, few physicians and nurses served or were represented in the HL7 discussions or votes that took place during summer 2003 and spring 2004. Qualitative research with nurses who work with EHR in a variety of ways can make significant contributions to making changes to EHR systems that promote the achievement of the goals set forth by DHHS and HL7.

EHR conversion and implementation projects are capital-intensive endeavors that drain both financial and human resources. Even with the commitment of time, money, and energy, project failures have been substantiated in the literature (Aarts, 2004; Burke, et al., 2004; Elson, 1997; Goddard, 2000; Lorenzi, 2000; Middleton, 1995; Sicotte, et al., 1998; Southon, et al., 1997; van der Meijden, et al., 2003). In addition, despite the numerous and diverse endeavors to establish EHRs, limited success stories are noted and few of these provide direct assistance to others who are trying to achieve the vision created by the IOM and others. Complex technical explanations for this general lack of progress predominate the literature pertinent to the 50% EHR failure rate (Keil & Daniel, 2001; McDonald, 1997; Miller & Arquiza, 1999; Poulymenakou & Serafeimidia, 2004; Shortliffe, 1999).

Many of the problems encountered in implementation of EHRs are both organizational and behavioral, and may be attributed to attitudes toward the use of electronic technology or failure of implementers to seek input from potential users (Beuscart-Zephir, et al., 1997). Additionally, technological and educational factors have also been cited as essential for consideration in EHR projects. Previous failures and the under-representation of nurses in the plans for implementation and evaluation of EHR's effectiveness point to the significance of this study and its potential to shed light upon the issues pertinent to health care providers charged with using and redesigning the system.

This concludes the summary of the background and significance of this study included in this Chapter. A complete and detailed presentation of a review of literature in this area is presented in Chapter II.

### **Overview of the Philosophical Foundations and Methods**

Phenomenology, in its broadest sense, is both a philosophy and a research approach (Burns & Grove, 2005). As a philosophy, it attempts to understand how meaning is made from human experiences and sees lived experiences as the foundations of meaning. As a research approach, phenomenology is the search for knowledge that leads to description, not explanation (Boyd, 2001; Munhall, 1989; Polifroni & Welch, 1999). In the following paragraphs, an overview of both phenomenology as philosophy and phenomenology as a research approach is presented. A summary of the *phenomenology of practice*, which was the specific research approach used in this study, is also presented. Details of each are fully discussed in Chapter III.

Phenomenology as philosophy started with Edmund Husserl (1859-1938) who believed that science had failed to be exact because it had not clearly described the essence of things before they were put into theoretical statements (Spiegelberg, 1982). Husserl moved beyond a seemingly mechanistic and abstract rendering of conscious processes to attest to ‘experiencing’ as the basic nature of consciousness, i.e., a straightforward, non-critical involvement with the things that we study.

In his return to everyday reality and the lifeworld, Husserl (1970) saw that it was not enough to explicate consciousness as simply a process or relationship between perception and its objects, but that the environment of perception, the everyday world in which consciousness lives and functions, is the concern and realm of phenomenology. According to Husserl, the world of lived experience, unexamined and undisclosed, is taken for granted in our everyday world (Polifroni & Welch, 1999). The goal of understanding lived experience depends on thoughtful consideration of the reciprocity between perception and the lifeworld, how perception contributes to lived experience (Merleau-Ponty, 1962). The philosophers who used and extended Husserl’s works include Kierkegaard, Heidegger, Marcel, Sartre, and Merleau-Ponty (Boyd, 2001; Munhall,

1989). All are responsible for moving phenomenology forward as an interpretive tool for understanding lived experiences in context, consciousness, and perspective.

Using Husserl as a frame of reference, researchers saw that studying humans necessitated viewing them as wholes that could not be isolated from their lifeworld experiences or separated from their conscious and unconscious awarenesses of meanings in their lives (Shultz & Cobb-Stevens, 2004). According to Shank (2002), what human beings really know are the influence of things on awareness, and not the things themselves. In the case of this study, the pure conscious and unconscious experiences of nurses working with EHR, uncontaminated by metaphysical theories, causal propositions, and scientific assumptions were necessarily captured using methods consistent with phenomenology and its research approaches. As Polifroni and Welch (1999) purport, it is in the search for understanding that subjectivity must be given a privileged position. Therefore, phenomenologic methods were designed and employed in this study's search for the subjective and meaningful lived experiences of nurses who used EHR in their daily work with their patients.

Based on the works and perspectives of contemporary scholars who conduct phenomenologic research in the disciplines of psychology (Amadeo Giorgi), nursing (Patricia Benner), sociology (Moustakas) and education and pedagogy (Max van Manen), the specific research approach known as the *phenomenology of practice* was determined to be the most appropriate research approach to achieve the aims and answer the research questions posed in this study. The *phenomenology of practice*, as a recognized approach within the context of phenomenology and the naturalistic paradigm, is guided by Husserlian philosophy, which suggests that essences of consciousness experienced from the first-person point of view can be captured through reflection and interpretive description (Boyd, 2001; Munhall, 1989; Polifroni & Welch, 1999).

According to Shank (2002), human beings come to know things by the effect those things have on one's consciousness. What human beings really know are the influences of things on our awareness, and not the things themselves. The *phenomenology of practice* used in this study facilitated the elicitation and rich

description of the lived experiences of nurses who were working with EHR. Their reflections and perspectives are expected to guide future EHR projects toward success and promote productive practice changes and positive patient outcomes.

### **Overview of Methods and Procedures**

In qualitative research, the sample is not randomized but is considered representative of the study group recruited for participation. In this study, purposive sampling strategies used to achieve a maximum variation sample guided the investigator to recruit and enroll participants believed to have experiences with EHR in the inpatient hospital setting (Denzin & Lincoln, 1998; Morse & Field, 1995). Previous research suggests that registered nurses in the inpatient setting are the most frequent users of EHRs, have key roles in determining the success of the EHR (Alpay & Russell, 2002; Darbyshire, 2000; Korst, et al., 2003; Lee, et al., 2005), and are able to articulately discuss their experiences and insights.

Fourteen full-time registered professional nurses employed at the target hospitals who met inclusion criteria for participation in this study were enrolled. A detailed description of the sample of participants is presented in Chapter IV. Sampling ended when redundancy and saturation of the data were reached. Lincoln and Guba (1985) state that saturation occurs when no new themes emerge from the data and redundancy occurs when emergent themes repeat themselves. Both saturation and redundancy were achieved when the sample reached 12 participants. Two more were enrolled to validate saturation and redundancy and to search for a negative case.

Only nurses with direct EHR conversion and implementation experiences were eligible to participate and they varied by years of nursing experience, computer experience (work and personal), and previous EHR experience. Administrators and managers were not eligible to participate.

After obtaining approval from the university's Institutional Research Board (IRB) to conduct this study, recruitment flyers were posted on unit bulletin boards at the hospitals. The flyers provided a short description of the study, the eligibility criteria, and information about how to contact the researcher for details about the study. Written,

informed consent was required for participation. After reading the consent form and prior to signing it, the researcher answered all questions raised by prospective subjects. The participants and the researcher then agreed upon a private venue and time for the interview. Discussion of the protection of human research subjects and the measures employed in this study to ensure confidentiality and anonymity are found in Chapter III.

This study collected three types of data: (1) biodemographic data, (2) narrative data, and (3) supplementary data. The biodemographic data collected included each research participant's age, gender, level of nursing education, area of nursing practice, length of nursing practice experience, computer experience, and previous EHR experience. Data were used to describe the sample as presented in Chapter IV. Narrative data, considered being the primary data in this study were the research participants' stories obtained through interviews. Each interview lasted between 60 and 90 minutes. A maximum of two interviews were conducted in order for the researcher and participant to clarify descriptions when necessary. The following are sample questions, which were asked during the interviews:

1. Describe your documentation practices before the EHR?
2. Tell me about your experiences during the implementation phase.
3. What impact has the implementation of the EHR had on the way you work now?

The supplementary data in this study included the researcher's personal journal, field notes, and methodological notes. The personal journal describes the researcher's reactions to events of the study. Field and methodological notes chronicle the observations pertaining to procedures and events as well as the researcher's suggestions for changes during the course of the study.

Data analysis procedures used in this study were guided by the fundamentals of phenomenology as described by Moustakas (1990, 1994) and follow the recommended steps proposed by Martins (1992). Moustakas has been influential in the growth and development of phenomenological methods in the social sciences and identified seven key principles that ground all phenomenological research in the social sciences. They are:

(1) a commitment to the use of qualitative methods, (2) a primary focus on the whole experience, rather than on its parts, (3) a search for meaning over a search for rules, (4) primary use of first person accounts as main data sources, (5) insisting that accounts of experiences are a necessary part of any scientific understanding of any social phenomenon, (6) performing research is guided by the personal interests and commitments of the researcher, and (7) the necessity of treating experiences and behavior as integrated parts of a single whole. Moustakas was used in this study to focus the researcher and maintain the standards of phenomenological exploration of human experiences.

To align data analysis in this study with the phenomenological underpinnings that support its conduct, Martins' (1992) three steps of data description, reduction, and interpretation were followed. Data description, the first step, has special characteristics intended to mirror and express a participant's conscious experience. Descriptions are derived from the transcribed audiotaped interviews, which were read and reviewed by the researcher many times over before data coding began.

The second step, phenomenological reduction, is a critical reflection on the content of description found in the data. Reduction was carried out at three different moments. During the first moment, using the descriptions in their original forms throughout each transcript, the researcher aimed to analyze a specific, bracketed lived experience without allowing personal or theoretical concepts to get in the way. In the second moment, data were arranged into themes as a result of a radical gestalt perspective that was created when units of significance (meanings) emerged from the narratives as focal reflections of participants' descriptions. In the third moment, the researcher focused on discriminating and linking participants' pre-reflexive descriptions of their daily lives, their psychological insights into the meanings of their experiences with EHR, and their own understandings of what happened to them when living the EHR experience. It is at this last moment when the researcher transforms the participants' everyday expressions into expressions appropriate to the scientific discourse supporting the research.

The third and final step of Martins' (1992) data analysis method is known as phenomenological interpretation. Learning about the phenomenon as a totality requires interpretation and involves capturing aspects of what has been revealed, both visible and hidden. By using logical inferences, reduction of the conscious experience enables the researcher to locate those elements of meaning that are empirically present in the situation and are perceived and expressed through the participants' discourse. Detailed data analysis procedures and the findings that emerged are presented in Chapters 3 and 4.

### **Assumptions**

A major category of change facing organizations today comes from the proliferation of sophisticated information technology. Information technology (IT) refers to networks of computers (like those in EHR), telecommunication systems, and remote controlled devices (Fulk & DeSanctis, 1995). All forms of IT are having a profound impact on individual employees, teams, and organizations. For example, experts who have studied its impact on organizations have observed that IT changes almost everything about the organization – its structure, its products, its markets, and its processes, increases the value of invisible assets, such as knowledge, competencies, and training.

To some extent, both individuals and groups in organizations resist change (Hellriegel, et al., 2001). EHR conversions and implementations represent individual and organizational changes in both administrative and patient care practices. Resistance to change often is abstruse because it can take so many forms. Overt resistance may be expressed through strikes, reduced productivity, shoddy work, and even sabotage. Covert resistance may be expressed by increasing tardiness and absenteeism, requests for transfers, resignations, loss of motivation, lower morale, and higher accident or error rates (Sharma, 1999). One of the most damaging forms of resistance is passive resistance by employees – a lack of participation in formulating change proposals and ultimately a lack of commitment to the proposals, even when they have had an opportunity to participate in making such decisions (Spiegelman, 2004).

Understanding the influence that resistance to change has upon a person's daily life is important to keep in mind when conducting research. Resistance to change must be

considered as part of the circumstance that affects subjects rather than studying it as a variable that can be described and measured in different ways. We need to realize the dynamic nature of change (and its subsequent effect – resistance to change), and acknowledge the person’s capability of adapting to change to overcome the hurdle.

It is assumed, for purposes of this research, that resistance to change is part of the lived experiences of nurses working with EHR. The researcher bracketed (Denzin & Lincoln, 2003) this assumption during data collection and analysis to avoid influencing the actual lived experiences narrated by the participants.

### **Limitations**

The purposes of this study also encumber its limitations. Given a small sample size and a phenomenological approach to the study problem, findings cannot be generalized to all nurses using EHR. More studies are needed to know the stories of these lived experiences of nurses. However, data presented here in themes can be used as a reference for key individuals involved in planning education and training programs or implementation strategies to adopt Electronic Health Record (EHR) systems in their organization.

### **Summary**

EHRs are becoming more prominent features of clinical areas. However, many studies indicate that organizations and institutions that implement electronic information systems either fail or report that the system is underutilized. According to the literature, nurses as the largest group of in-hospital health care providers that use the EHR 24 hours a day contribute greatly towards the success of implementation projects. However, only a few qualitative researches have been conducted. The overall goal of this dissertation study was to explore and describe the lived experiences of nurses working with Electronic Health Records (EHR). The specific aims, research questions, philosophical underpinnings and methods were discussed. The assumptions and limitations of the study were specified.

## **Chapter II: Review of the Related Literature**

Implementing use of the electronic health record (EHR) in health care delivery systems where limited computer support and handwritten notes once prevailed is capital-intensive and entails the commitment of resources such as staff, time, energy, and creativity. Despite the numerous and diverse endeavors of multiple health systems and corporations to implement EHR, the failure rate is a staggering 50% (Keil & Daniel, 2001; Lorenzi, 2000; Poulymenakou & Serafeimidia, 2004). Although quantitative studies have provided some insights about the causes of EHR failure, more qualitative research studies that examine nurses' experiences with the technology are needed. Nurses use the EHR system 24-hours a day. Rich information provided by nurses through qualitative research studies has the potential to shed light on issues with EHR conversion, implementation, and use, and may be used by planners of change to improve the EHR success rate.

A literature search, using PubMed and CINAHL, from years 1980 to 2007 was conducted and publications focusing on EHR use and implementation were retrieved and reviewed. Seminal articles were integrated to highlight important insights. The following discussion of extant literature and the context it creates for new knowledge development is organized into sections that address organizational, behavioral, technological, and educational factors.

### **Organizational Factors**

Implementing the EHR is a significant change for most health care institutions that affects the everyday tasks of all employees and organizational management as a whole. Issues pertaining to organizations such as change, change management, leadership, productivity, outcomes, and conflict are included in this review.

In the Webster's New World Dictionary (1999), the word "*change*" is both a verb and a noun. As a verb, it is defined as "*to put or take (a thing) in place of something else; substitute for, replace with, or transfer to another of a similar kind;*" while as a noun, it is described as "*to become different, to undergo alteration or replacement, to pass from one phase to another.* (p. 245)" From a management perspective, change refers to alterations

in people, structure, or technology (Robbins & Coulter, 1999). Organizations implement change to improve their competitive edge and position themselves for a more effective future (Kotter, 1996). More often than not, the decision to change, such as the introduction of an EHR system, originates from upper level management without much if any input from lower level staff. Gremy (1999) argued that staff generally views the imposition of change by management as a threat. In addition, the need for staff to learn new sets of skills and behaviors that differ from those that maintain the status quo, causes some degree of discomfort and fear. New ways of doing things threaten the security of familiarity with how work usually gets done (Nemeth, 2003). These factors have been found to contribute to resistance to change, which may result in failure of an EHR to be successfully implemented and used.

FitzHenry and Snyder (1996) assert that resistance to change explains why medical records remained manual tasks and have basically remained unchanged for over six decades. A majority of organizations and institutions that implemented EHR in the recent past have either failed or reported that the system was underutilized (Lorenzi, 2004). Because barriers to change and failed changes are important to comprehend as lessons for future successes, in-depth knowledge about the change process is necessary.

Changing to EHR is not entirely about the technology because successful implementation also transforms the way nurses work and how they deliver their services. Nurses must have input into the proposed change discussions, processes, and outcomes. However, in most cases found in the literature, nurses have not been asked to participate. As this study discovered, nurses have many things to contribute to the success or failure of the EHR.

The literature is replete with change theories and their uses in research and practice must be discriminately processed. Prochaska et al. (1992) offered an adapted transtheoretical model to describe the five stages that individuals go through in a change process, namely: pre-contemplation, contemplation, preparation, action, and maintenance. Some of their approaches are suited to examining change in health care

settings. They are also useful in interpreting findings of studies that include change as a phenomenon or factor.

Prochaska et al.'s (1992) first stage is *pre-contemplation*, which is also called the denial stage. In this phase, nurses may remark, "documenting the 'old' way works just fine," or "using a computer will take time away from patient care." The next stage is *contemplation*, which occurs when the nurse recognizes that the problem exists, but is not prepared to get involved in the change. In the case of this study, during *contemplation*, a nurse may read about EHR, talk about it with colleagues, or ask "Can technology help me in my practice?" In the *preparation* stage, one gets ready for the change by internalizing the decision to make the change and participating in the process. Helping nurses prepare for EHR by providing opportunities for involvement will, according to this theory, help alleviate their resistance. According to Lorenzi (2004), "*if they (nurses) have ownership in the process they will help to ensure the system's success.*"

The *action* stage (Prochaska, et al., 1992) is the implementation phase, which is directed towards the desired change wherein the leader applies suitable approaches and facilitates the process encompassing technological issues involving people and workflow. Staff resistance as well as conflicts and other issues may arise at this stage resulting from inadequate preparation regarding changes in workflow practices. Approaches for effective communication and involvement are keys to successful implementation. In the last stage, called *maintenance*, the focus is on keeping the new system (or change) in place. During this time, a temporary decline in productivity is expected and may be attributed to time allocated for training and the learning curve that people need to go through in order to adopt the new system. In nursing settings where EHR is being implemented, additional staff may be required as continuous adjustments are made.

### ***Leadership in and Management of Change***

Several researchers that have studied leadership and management styles in the context of planning and implementing the EHR stressed the importance of the specific types of leadership in different stages of EHR projects. For example, Miranda et al. (2001) and Scott et al. (2005) found that a participatory type of leadership was important

during the EHR software selection process. However, Miranda et al. (2001) also suggested that the development of a broad support base for both vertical and horizontal decisions in the organization is necessary and should be carried out by cross-disciplinary teams not only during the software selection process but also during EHR implementation. In contrast to Miranda et al.'s (2001) findings, respondents in the study by Scott et al. (2005) believed that a decisive hierarchical leadership would be more appropriate in the EHR implementation phase because consensus-seeking leaders sometimes promote passive resistance that challenges implementation.

It is suggested in the literature that leaders of EHR projects should also be exceptional communicators and have excellent group process skills. Miranda et al. (2001) explained that a technically excellent computer person without the requisite communication and group process skills might fail because of the inability to develop broad support and facilitate consensus. If consensus is not reached, a skilled communicator and leader will know what to do to listen to dissenters and address their concerns. Addressing concerns and conflicts in a timely manner has been noted to avoid crises that otherwise emerge because of unresolved issues.

It is also reported that leaders must be readily available to support the staff and be open to new ideas for improvement related to the change. Hughes (2003) added that the role of management at different levels in supporting EHR developments is central to successful system implementation. Positive attitudes and experiences on the part of executives, including nursing directors and nurse managers, can influence acceptance of the technology and increased EHR compliance among staff (Hebert & Benbasat, 1994; Lee, 2006; Reeve & Rose, 1999).

The term *change management* is used in the literature and in practice to describe the process of implementing change (Nemeth, 2003) where the primary intention is for the process to be planned, systematic and effective. Nancy Lorenzi, president of the International Medical Informatics Association and an expert on change management in health informatics detailed strategies for effecting successful change. Salient points were summarized by Teasdale (2005) as follows: set and communicate clear objectives,

formulate a strategic plan, and modify when necessary; work at achieving ownership of the plan by people at all levels; pay attention to the organizational culture and whether it supports the changes being implemented; develop leaders and champions for the change not just those in traditional positions of power; be patient and resist false urgency; stay involved and keep communicating; evaluate; seek feedback and act on it; and plan ahead for the next phase of change.

In a study about improving organizational processes during implementation of EHR in a 225-bed acute care facility in California, FitzHenry and Snyder (1996) concluded that *selling the change* in three directions is effective. This starts from the bottom-up, to administration for empowerment or authorizations; top-down, to users for compliance; and sideways to medical staff for acceptance. In order to promote acceptance or “buy-in,” Nemeth (2003) has suggested that leaders need to enlist followers in the shared vision and in understanding the rationale for the change.

### ***Productivity***

Researchers have asked questions about whether or not EHRs allow nurses to be more productive from the perspective of spending more time with their patients rather than recording their work. Findings have varied. Nurses in the Lee (2002) study reported that the EHR added more paperwork and stress to an already busy routine. They also noted that the electronic system imposed a “*usage pressure*” that was related to the nurses spending more time on the computer.

In the research by Scott et al. (2005), a decrease in nurse productivity was attributed to extra work specifically in processing laboratory reports, entering orders, and navigating through the system. Despite the provision of additional staff to help in the initial workload, the extra time burdens related to EHR, estimated to be between 30 and 75 minutes a day, persisted even after the initial learning period. The burden of time also reportedly affected patient care in that there was little time left to deal with “overload” patients. This finding is consistent with the studies conducted by other investigators (FitzHenry & Snyder, 1996; Lee, 2006) where partial automation of a formerly all-paper documentation system increased labor and decreased accuracy. In contrast, other studies

reported that automation of nursing information, for instance in care plans and charts, increased both nurse productivity and effectiveness (Krampf & Robinson, 1984). Additionally, a four-year Australian study (Fraenkel, et al., 2003) reported that EHR was perceived as a benefit to critical care nurses by allowing less time documenting and more time providing patient care.

### ***Other Outcomes***

Aside from productivity, other outcomes, both negative and positive, were also described in the literature. In a critical care setting, Popernack (2006) used a 15-question electronic survey instrument to study critical care staff nurses' perceptions of a Computerized Physician Order Entry (CPOE) system's influence on their daily workflow one year after the new technology was initiated. The respondents (n=246) reported the negative outcomes of CPOE as: less verbal communication, issues related to laboratory completion, computer availability; double charting tasks on paper and computer; cosigning multiple doses of high-risk but commonly used medications; learning curve to master; and order cleanup. Positive outcomes reported by the sample in the Popernack study were related to improvements in efficiency related to CPOE's automatic dissemination of orders. This dissemination resulted in fewer phone calls made to other departments such as pharmacy, radiology, respiratory therapy, and laboratory services; thus, saving time. However, the respondents did say that they were no longer able to communicate verbally and work "closely" with the other departments the way they were used to when the old system was in place. Subjects in the ICU setting reported that there were extra steps added for specimen collection and processing when CPOE was implemented. For example, the necessity of completing the task in the system prior to sending the specimen, ensuring that the order identification number of the laboratory slip matches the task completed, and for repeated specimens, reentering the order to generate a new requisition has been a major adjustment for ICU nurses. The volume of laboratory work performed in ICUs for the medically fragile patients were important to consider. In addition, the inherently rapid pace of the ICU and the required patient safety protocols such as cosigning high-risk medications prolonged documentation time. In the same

study (Popernack, 2006), another factor that influenced nursing efficiency was the number of duplicate or conflicting orders entered by multiple services and lack of discontinuation of orders upon new order entry. However, as the learning curve continued to flatten among this sample, more complete and accurate orders were entered and less time was needed to check and carry out those orders.

In terms of workflow processes, Laerum et al. (2001) found that the EHR used in some hospitals in Norway reinforced and maintained existing work patterns among nurses and doctors rather than change them. The authors asserted that technology alone was not sufficient to achieve a well-functioning electronic information system and that organizational aspects must also be considered. They added that performing tasks differently often means a disruption in previously established workflows, which may result in resistance to any change.

However, other researchers (Butler & Bender, 1999; Miranda, et al., 2001) believe that redesigning work processes is key when a new system is introduced. If not, the pressure to change, particularly in the early stages of implementation, overwhelms nurses especially when they do not perceive the advantages or benefits of the change (Herbst, et al., 1999; Wilson, et al., 2000). In addition, since the first three to six months in the change adoption process have been found to be critical to testing an innovation and to adopting new workflow procedures (Lising, 2005; Larrabee, 2001; Nahm, 2000), staff performance may be decreased during this period. Hence, dual charting and the learning curve of users should be taken into account when evaluating technology usage and appraising staff performance.

Positive outcomes have been associated with EHR use. In technologies where health care data is integrated at the point of care (e.g. PDAs), communication between staff was found to be more effective (Dudman, 2000; Hughes, 2003; Mercadante & Lanza, 1994) and has increased the quality of patient care by nurses (McHugh, 1992; Weiner, et al., 1999). In addition, Scott et al. (2005) indicated that with the computerized information system, the staff in their study had a greater sense of accountability and clarified responsibilities for making clinical decisions. Participants stated that since

documentation is electronic and people can read everything, there has been a change in the psyche of the staff in that they are more aware of what they are putting in the chart. Study participants reported that they experienced innovative adaptations to changes brought about by EHR, such as allowing nurses to act as results managers to screen laboratory results. In the intensive care unit, the nurses reported that the advantages of the EHR system included legibility of doctors orders without transcription errors, medications that are delivered faster and are easier to chart, fewer follow-up phone calls needed to verify orders, quicker implementation of orders, and easier access to information.

### ***Conflict***

The term conflict refers to “*incompatible differences resulting in some form of interference or opposition*” (Robbins & Coulter, 1999, p. 455). In critical projects such as EHR conversion where groups perform assigned tasks, disagreements and conflicts are inevitable. Researchers studying various aspects of EHR have identified different sources of conflict and resolution strategies. Scott et al. (2005) reported internal conflict between staff who were receptive to the electronic transformation and those who were skeptical about the project. Staff who were receptive experienced mixed feelings of relief and loss in relation to the withdrawal of the old paper system and implementation of the new EHR system.

Lee (2006) also reported ambivalent feelings and complaints among nurse managers, which also created stress and conflicts among them. Lee’s qualitative study looked into the nurse managers’ (n=16) experiences with implementation of the PDA (Personal Digital Assistant, a computer handheld device for nursing documentation). The stress and conflicts reported were exacerbated by the increased staff workload such as dual charting during the initial phase of system implementation. Furthermore, posting of that hospital’s monthly PDA usage reports added to the staff’s stress levels. Lee therefore theorized that the ambivalence and stress came from pressures of having to use the device and not seeing the benefits of using it. Lee recommends that in order to facilitate the nursing staff through the change process, nurse managers need to be mindful of the

strengths and limitations of technology, the political objectives of the organization, and the strategies for coping with problems in work environment. Not only do these considerations need to be taken into account during daily unit management, but also incorporated into in-service education programs.

Other causes of conflict include the discrepancy between expectations of the EHR and actual computer operations (Miranda, et al., 2001) and certain process-related EHR inefficiencies where documentation takes more time than paper-based systems (Hughes, 2003). Bozak (2003) added that resistance to technological change is also a factor which gives rise to conflict because of concerns about intrusions into the routine manner of performing tasks. Staff who take on extra duties related to technological change do not necessarily enjoy the benefits of more efficient work patterns. Laerum et al. (2001) have suggested that new reward systems are needed to promote the acceptance of new work roles.

### **Behavioral Factors**

Attitudes are “*evaluative statements – either favorable or unfavorable, concerning objects, people or events*” (Robbins & Coulter, 1999, p. 419). Attitudes influence the development of behavior, which then initiates a response to a situation. Scarpa et al. (1992) suggest that there is a strong connection between attitudes and learning new skills. Therefore, it is vital to know the attitudes of nurses toward acceptance and willingness to utilize the EHR.

#### ***Attitudes Toward Computers***

Attitudes toward computers can determine the intention of an individual to facilitate or impede EHR implementation. Negative attitudes toward computers may cause nurses to avoid using computerized systems or even resist the introduction of such systems to an organization (Scarpa, et al., 1992). The business sector has shown that attitudes of computer users are key determinants of use patterns in the work place and are predictors of resistance to change when a negative attitude prevails (Robins & Coulter, 1999).

Assessment of nurse attitudes early in a proposed change process enables project managers to carefully plan the design and implementation. Early assessment allows planners to influence the development of positive attitudes, perceptions, and expectations, as well as to correct misinformation. Stronge and Brodt (1985) recognized the need to adequately assess nurses' attitudes towards computers not only to develop implementation strategies, but also to support nurses who were less willing to accept computerization.

A plethora of studies have examined the importance of nurses' attitudes toward how successfully computers are introduced into a nursing unit (Ammenwerth, et al., 2003; Axford & Carter, 1996; Bongartz, 1988; Burkes, 1991; Dillon, et al., 1998; Krampf & Robinson, 1984; Lee, et al., 2005; Lowry, 1994; Maarasovic, et al., 1997; Murphy, et al., 1994; Prophet, et al., 1998; Scarpa, et al., 1992; Shumway, et al., 1990; Simpson & Kenrick, 1997; Sleutel & Guinn, 1999; Stockton & Verhey, 1995; Stricklin, et al., 2003; Sultana, 1990).

Study designs have varied from one-time descriptive studies examining demographic variables influencing computer acceptance, to studies comparing users with nonusers, and measurements of attitudes pre-computerization and post-computerization.

Descriptive studies report correlations between nurse attitudes and such variables as age, educational level, and previous computer knowledge and experience. However, results are inconsistent. On one hand Lowry (1994), Simpson and Kenrick (1997), and Getty et al. (1999) found age to be a factor in attitudes. Younger and less experienced nurses have a propensity toward more positive attitudes. On the other hand, Scarpa et al. (1992), Murphy et al. (1994), and Marasovic et al. (1997) found no such correlations. Marasovic et al. (1997) added that less nursing experience had a statistically significant and positive effect on nurses' motivations to use computers.

Mixed results are also found among reports of studies about previous knowledge and experience with computers and attitudes towards them. Krampf and Robinson (1984) and Scarpa et al. (1992) reported positive attitudes associated with prior experience, while Bongartz (1998) and Burkes (1991) found that nurses with more computer

experience had less positive attitudes. However, no relationships were found between computer knowledge and attitudes (Burkes, 1991; Liu, et al., 2000; Lowry, 1994; Murphy, et al., 1994; Scarpa, et al., 1992; Sultana, 1990). However, computer courses are slowly being integrated into nursing curricula as well as in new nurse employee orientations. As a result, resistance is diminishing and the influence of demographic factors is declining (Wilson, et al., 2000). According to Simpson (2004), the newest nurses are more confident in using the EHR and could be expected to adapt well.

Attitudes pre- and post-computer implementation were studied by several researchers and contrasting findings have been reported (Ammenwerth, et al., 2003; Murphy, 1994; Prophet, et al., 1998; Sleutel, 1999;). The Prophet et al. (1998) study showed more positive attitudes among the subjects while those in the Murphy et al. (1994) and Sleutel (1999) studies reported less positive attitudes. Ammenwerth et al. (2003) studied acceptance of computers in nursing and found increased acceptance scores on three of four study units nine months post-implementation.

### ***Acceptance and Willingness***

Staff acceptance and willingness to use the system have been found to be one of the chief determinants of EHR system success in an organization (Goddard, 2000; Lorenzi, 2000; Middleton, 1995). One important factor in staff acceptance of the product is willingness to use the EHR optimally. Nurses who regularly interact with other care providers have been found to be critical to successful implementation. Nurses speak to nearly every other care provider, and their attitudes and perceptions significantly influence the perceptions of other providers and how they use the EHR. Findings from a research study conducted by Popernack (2006) revealed that physicians' reliance on nurses' assistance in maneuvering through the EHR caused them to experience elevations in their levels of anxiety over EHR use. This significant finding suggests that a separate physician training is needed or that collaborative training become standard and accepted ways of promoting change.

A number of studies (Ash & Davis, 1989; Gorma & Lavelle, 2003; Ball, et al., 1985) have found that nurses are quite often the resource other health care providers

access when they have concerns about the use of EHR. Researchers also investigated the connection between nursing documentation, user acceptance, and patient care. Ammenwerth et al. (2003) found that users' acceptance was influenced by previous acceptance of the nursing process, computer experience, workflow change and functionality of the system. Such findings provide a significant push in ensuring that staff members are integrally involved in the design, development, and implementation of EHR.

### **Educational Factors**

The growing use of information technology (IT) in health care has crucial implications for the way nurses work. Furthermore, it has larger implications on their educational and training needs in order for them to use the new technology. These issues will be addressed in the following section.

#### ***Basic Computer Training***

Even though basic computer training differs from training to use a particular EHR system, the former type of training will more often than not complement the latter. Fundamental computer skills include how to turn the computer on, how to log off, what the mouse is for, how to enter information and save data, how to activate the printer, and how to access the Internet, among others. In the literature, difficulty in providing information technology training is generally attributed to inadequate or nonexistent training programs, negative attitudes toward computer technologies, and lack of interest toward and difficulty in prioritizing training needs.

In a study by Alpay and Russell (2002), nurses (n=225) who were surveyed expressed a desire for initial basic training. Different types of information technology training were reported as colleague's help, in-house training, external training, user manual, and on-screen help. Formal training in basic computer skills was minimal (5%). Other nurses reported that neither in-house trainer nor external trainer was available. Some nurses between the ages of 40 and 60 years of age relied on their children to help them use computers at home, while others sought help from colleagues.

Computer training has been found to increase nurses' computer competence to learn a new system such as EHR. Hobbs (2002) performed a comprehensive review of published measures of computer competence from 1990 to 2002 utilizing multiple competency assessment instruments of varying quality. Hobbs found little agreement regarding specific computer-focused competencies necessary for nurses. However, there was consensus that the computer-competent nurse possesses a general knowledge and understanding of computer technology in addition to a positive attitude towards computers and software. Consequently, such a nurse is skillful in computer hardware and software use and able to grasp how such technology benefits nursing and overall health care setting.

### ***EHR Training***

Training strategies used in EHR implementation projects include classroom or group training, computerized self-learning, and "super-user" approaches (Alpay & Russell, 2002; Lee, 2006; Richards, 1992; Simpson & Kenrick, 1992). The didactic component is an 8-hour structured training day in the classroom or auditorium setting (Popernack, 2006; Sleutel, 1999). Although auditorium settings and use of slide presentations are suitable for larger groups, Lee (2006) reported complaints that when slides were shown too quickly or when the audience could not clearly see the large screen, nurses were unable to grasp the content. Graphics and flowcharts were reported to be helpful tools of instruction. Nurse participants were able to focus and understand the process change, workflows (FitzHenry & Snyder, 1996), and impact of EHR. In order to reinforce instruction, printed manuals and quick reference guides were also made available and were found to be helpful.

Lee (2006) pointed out that scheduling group training was difficult due to nurses' varying work schedules. In addition, hands-on computer training was not always able to be included in the 8-hour training because of class size and availability of facilities. The limited availability of computers for use in training was also reported as a problem for other care providers such as physicians, respiratory therapists, radiologists, and pharmacists. The training timeline in Lee's study was two months prior to the "go live"

date and is recommended as sufficient time for nurses to familiarize themselves with EHR using hands-on interactive practice systems (Sleutel, 1999). Using such strategies is tied to success of EHR because practice raises the nurses' levels of confidence.

### ***Superusers***

*Superusers* or *product champions* (Harley, et al., 2006) are proficient computer users who are selected early in a project. The chief role of superusers is to provide support both during end user training and during the "go live" phase. Nurses who are superusers are instrumental in the organization's adoption of the technology (FitzHenry & Snyder, 1996; Lee, 2006). Not only do they encourage end users to cooperate with automation efforts, superusers also provide support at the grassroots level particularly with the less computer-skilled staff. However, Littlejohns (2003) expressed concern that product champions need to be kept in balance as their interest in using the system may push them to do more than what is required to assist in a colleague's daily EHR competency development. Lee (2006) reported that an effective strategy to maximize the role of superusers in a given unit is to assign a superuser for each shift, as well as weekends and holidays. This idea smoothens the technology adoption process and ensures staff that EHR support is readily available.

### ***Training Outcomes***

Nurses' perceptions of EHR training are varied. Poppornack (2006) conducted a survey on critical care nurses' (n=247) perceptions after one year of implementing a fully integrated Computer Physician Order Entry. It was found that in general, the two months prior to go-live training, which was made up of an 8-hour instructor-led didactic with hands-on component in an interactive practice system that replicated the actual program, was adequate to implement the system. Less computer-skilled nurses, however expressed dissatisfaction with the brief training (6.5 hours didactic and 1.5 hours hands-on training) in preparation for EHR use. Some nurses suggested that two four-hour hands-on training sessions would be appropriate with the use of unit-based case scenarios and would be less overwhelming. Others voiced that more hands-on training was needed closer to the actual implementation date.

In the United Kingdom, Alpay and Russell (2002) elicited primary care nurses' (n=225) perceptions on information technology (IT) training using a survey questionnaire and focus groups. The authors reported that nurses wanted initial basic training and a user-friendly reference manual written in such a way that they could understand the directions. In the same research study, the older nurses in the study group relied upon their children to help them gain competencies while using home computers, which they did quite successfully. Nurses voiced their desire for basic IT skills and management of information to complement their learning of software in the workplace.

### **Technological Factors**

Technological devices such as software and hardware are costly. Efficient and effective use of these tools is crucial to the success of EHR implementation. Feedback from end-users needs to be taken into account to maximize utility and improve the system.

### ***Software***

Several key issues pertaining to software design and implementation were cited in the literature. First, in terms of software design, there is consensus that nurses should have input into content design and development (Lee, 2006; Poppernack, 2006; Scott, et al., 2005) starting from the initial concept to the final steps. The design should be congruent with and responsive to the type of nursing practice within the organization (Middleton, 1995). Moreover, lack of staff involvement or "ownership" of system changes contributes to resistance. According to Lorenzi and Riley (2004), human beings do not necessarily resist change automatically; however, many people do resist being changed; that is, having changes imposed on them. In organizations, change involves a sense of threat such as disruption in the established routine. This accompanies a sense of personal loss, which can cause workers to resist and in some instances sabotage the change initiatives.

Another important factor pertaining to software is user-friendliness. In a qualitative study by Darbyshire (2000), participants referred to a number of concepts that were perceived as characteristics of a user-friendly EHR system. Accessibility through

passwords is essential, although in some research studies (Darbyshire, 2000; Alpay & Russell, 2002) nurses referred to it as a hassle because of frequent changes for security reasons. Clarity, navigability, and ease of use of computer screens were also important. Some screens were found to be more intuitive while others required circuitous steps. Poor navigability was an irritant and nurses preferred icon-driven menus and graphic interfaces to drop-down menus (Darbyshire, 2000; Scott, et al., 2005). As for ease of use, prompts or messages were very helpful when information was entered incorrectly. In addition, compatibility, functionality, and reliability also contribute to user-friendliness.

Other studies have reported that programs such as barcodes for medication administration need to be compatible with laboratory and pharmacy (Abdoo, 1992; Littlejohns, Wyatt & Barvica, 2003; Popernack, 2006) and new software also must be compatible with the hardware (Tonnesen, et al., 1999). If compatibility is not ensured, programs and devices will not communicate and the risk of underutilization of the EHR system will rise. The speed or functionality of the system in terms of how fast data loads on screens are also vital because slow response systems were likely to be used in actual practice (Darbyshire, 2000). Most importantly, the value of system reliability cannot be overemphasized. In a failed implementation, computer malfunctions resulted in some hospitals not having their computers functioning up to six weeks at a time (Littlejohns, et al., 2003).

### ***Hardware***

Nurses' concerns found in the literature pertaining to hardware include printing issues, computer availability and speed, networking or connectivity, and portable devices. Littlejohns (2003) noted that ease of making printouts was not given appropriate attention and Darbyshire (2000) reported that the lack of uniformity in printing policies and equipment reduced the users' opinions of the system. The number and speed of computer terminals were also pointed out as important. Reports indicated that nurses had to wait because not enough computer terminals were available on the units (Darbyshire, 2000; Littlejohns, 2003). Many clinicians are familiar with faster and more responsive computers at home and find it difficult to use a slower computer in the workplace. Nurse

managers, in the study conducted by Lee (2006), voiced concerns about portable devices (PDAs) having a lag time of a few hours. The PDA tool could help them become more responsive in their roles if they acted in real time or close to real time so that access to data would facilitate evaluation of staff's workflow and productivity.

### ***IT Support***

Information technology support is valuable for both software and hardware technologies, which includes the following but are not limited to EHR system support and repair, maintenance, and upgrades. Although this was not discussed exhaustively in the literature, a few studies emphasized its importance (Darbyshire, 2000; Hughes, 2003; Littlejohns, et al., 2003; Popernack, 2006). In terms of software, Darbyshire (2000) elicited nurses' preference of onscreen helpline or interactive tutorial program more than the telephone helpline, which was found to be cumbersome and time consuming. Poppornack (2006) found IT support via a 24-hour helpdesk phone system very effective.

### **Summary**

Previous studies have shown that organizational, behavioral, educational, and technological factors are crucial in implementing EHR. Several key topics that have implications in the way nurses work have been emphasized in the literature. Organizational issues such as change, change management, leadership, productivity, outcomes, and conflict are included in this review. Behavioral issues, namely: attitudes, acceptance, and willingness; as well as educational issues (e.g. training) are salient topics associated with learning new skills such as the EHR. Software, hardware, and support are important considerations to maximize utility and improvement of the system. Although not exhaustive, this review of extant literature creates a context for new knowledge development.

### **Chapter III: Methodology**

This chapter explains the research design and methods used to accomplish the aims and answer the research questions put forth in this study. The procedures employed in this *phenomenology of practice* to collect, analyze, and interpret data are described as well as the standards used to evaluate rigor and truth value. The protection of human subjects is also addressed in this Chapter. Findings of this study will be presented in Chapter IV. Discussion, conclusions, and recommendations related to the findings of this research will be presented in Chapter V.

#### **Research Aims and Questions**

This study explored the lived experiences of nurses working with EHR in target hospitals at a university medical center in the southwest United States. Methods and procedures employed in this *phenomenology of practice* aimed to: 1) understand the subjective transitional experiences of nurses working with EHRs as revealed by their stories about the conversion to a new electronic documentation system, 2) identify the challenges discussed in the stories about the documentation process and related changes in the workplace, and 3) describe strategies the nurses used to help them adapt.

Achieving the aims of this study provided answers to the following research questions:

1. What are the lived experiences of nurses working with EHR?
2. How do nurses describe the influence EHR has on nursing practice and patient outcomes?
3. What factors do nurses describe as essential to EHR implementation and evaluation?

#### **Study Design and Methods**

##### ***Phenomenology as Philosophy and Method***

Husserlian phenomenology guided this investigator's exploration and description of nurses' lived experiences of working with EHR because it offered ways to look into and bring forward the existential nature of the phenomena in the context of nursing practice with patients (Shultz & Cobb-Stevens, 2004). Edmund Husserl, the father of the

philosophical discipline of phenomenology (Polifroni & Welch, 1999), purports that lived experience is free from all assumptions of existence or causal influence and can be known and described by pure data of consciousness, uncontaminated by metaphysical theories or scientific assumptions (Polifroni & Welch, 1999). In essence, phenomenological approaches to the study of lived experiences involve reflections of the essence of consciousness described by first-person points of view, also called accounts of the lived experience.

The Husserlian frame of reference allows the researcher to capture the ‘piece’ or a ‘moment’ of a whole which cannot be isolated or understood apart from the whole (Shultz & Cobb-Stevens, 2004, p. 216). In the case of this study, EHR introduced into the whole experience of nursing practice with patients is viewed as a piece of the phenomena or moment in nursing practice that cannot be understood apart from the whole because while it influences the whole, it cannot be taken or studied apart from the whole. Specifically, the use of EHR and its influence upon the practice of nursing and patient care outcomes is the whole of nursing practice and is understood as such.

While nursing practice is a known and moderately well understood phenomenon within the discipline, the newly introduced EHR is expected to influence the whole of nursing practice. However, without descriptions of the lived experience of EHR in the whole of nursing practice, its part in the whole cannot be understood. Therefore, as the research questions direct, the experiences of EHR use in the context of nursing practice are the foci of this study.

The strategies used to elicit staff nurses’ awareness of their lived experiences with EHR were consistent with narrative description. That is, the research questions posed in this study were not focused on EHR itself, but on how EHR affects nursing practice and patient outcomes. According to Shank (2002), what human beings really know are the influence of things on their awareness, and not the things themselves. Therefore, it was the lived experience of nurses who use EHR that was sought to understand the multiple subjective perspectives of the nurse’s awareness (or consciousness) of EHR’s influence in daily nursing practice with patients and as an organizational change that influences

practice, context, and outcomes. Using the open-ended questions displayed in Appendix B as the Interview Guide for this study, the participants described their lived experiences in their own words, thereby describing the phenomena of interest in an unrestricting manner.

Invoking Husserl's philosophical position and employing phenomenological study methods, contemporary scholars in several practice disciplines have advocated a research approach called *phenomenology of practice* as appropriate to use when the aim of an investigation is to understand lived experiences in the practice disciplines of psychology (Amadeo Giorgi), nursing (Patricia Benner), education (Max van Manen), and sociology (Moustakas) (van Manen, 2002).

The distinction between phenomenological research conducted by philosophers and phenomenological research conducted by professional practitioners is found in each study's purpose. A philosopher may study a transcendental phenomenon while a professional practitioner is more likely to study applied human sciences in a context where the phenomena pertinent to the discipline are experienced. Studies of nurse-patient relationships or how elderly experience pain are examples of phenomena that lend themselves to study by the *phenomenology of practice* in the discipline of nursing.

In the context of a practice discipline, like nursing, Taylor (1995) provides an exceptional description of purposes and benefits of phenomenological research. She states:

The search for the nature of a phenomenon begins with the people, in their place and time, and it leads to an explication of the aspects of the phenomenon. The nature of a phenomenon is a reflection of the nature of people as human beings, who find themselves within the context of a healthcare institution, who are living and making sense of their experiences. The language used by the people in the study not only illuminates the nature of the phenomenon of interest, but it also shows some of their own There-Being as human beings (p. 79).

Based on the preceding passage provided by Taylor and supportive evidence from researchers in other practice disciplines, the *phenomenology of practice* was selected as the most appropriate research approach to use to achieve the aims and answer the research questions posed in this study. While there are no hard and fast rules or

procedures that must be followed when doing any type of phenomenological study, the procedures related to this study's recruitment of participants, data collection and analysis, and the protection of human subjects are described in the sections that follow.

### ***Setting for the Research***

The sample of participants for this study were recruited from the population of staff nurses with varying levels of EHR experiences, who were employed at several hospitals within a large university medical center in the southwest United States. The researcher chose this target population and setting because the target institution implemented a hospital-wide EHR in 2005. Furthermore, research has shown that registered nurses who use the EHR in the workplace are able to reflect on and discuss their experiences related to EHR implementation.

At the proposal defense for this dissertation study, dissertation committee members unanimously endorsed the recruitment of study participants from the member hospitals at the target institution, rather than drawing a sample from multiple institutions across the region or the United States. This recommendation was based on: (1) the evidence that variations in EHR exposures at this one institution would be sufficient to elicit the broadest range of experiences, and (2) the importance of examining lived experiences with one rather than several electronic health information systems.

### ***Population and Sample Selection***

Phenomenology and other qualitative research approaches seek to gain the broadest range of perspectives about phenomena of interest to the investigator. To procure such a sample, the investigator conducting this study employed maximum variation sampling techniques to select a study sample that had a broad range of demographic diversity and knowledge about and experience with EHR. An appropriate and adequate sample (Denzin & Lincoln, 1998; Morse & Field, 1995) was drawn during this study from the population of registered nurses currently using EHR in inpatient settings across the hospitals within the university medical center described earlier. Previous research suggests that registered nurses in the inpatient setting are the most frequent users of EHRs, have key roles in determining the success of the EHR, and are

able to articulately discuss their experiences and insights with the system (Alpay & Russell, 2002; Darbyshire, 2000; Korst, et al., 2003; Lee, et al., 2005).

Since staff nurses at the target institution use EHR more frequently than nurses in leadership roles in the same institutions, administrators, managers, and supervisors were not eligible to participate in this study. In addition, in order to be eligible for participation in this study, staff nurses must have had a minimum of four months experience using the EHR system so that insights about elements essential to implementation and evaluation of EHR could be described (S. Liong, EHR Implementation Consultant, personal communication, Feb. 10, 2006). In addition, only potential subjects who were willing and able to participate in face-to-face audio taped interviews were eligible to participate.

With the study population identified and eligibility criteria formulated, appropriateness and adequacy were the next two principles employed to guide the investigator's sampling procedures (Morse & Field, 1995). Denzin and Lincoln (1998) describe appropriateness as the selection of sample participants that have knowledge of the phenomena under study and are willing to participate. Adequacy is the "amount of data collected, rather than the number of subjects" (Denzin & Lincoln, 1998, p. 76), which means that enough data are available in the sample to develop a rich description of the phenomena under study. Adequacy also permits saturation of the data (Lincoln & Guba, 1985), which means that no new meanings emerge from data collected during additional interviews (Burns & Grove, 2005).

To meet the criteria of appropriateness and adequacy, a total of 14 registered nurses were recruited and enrolled. The purposeful selection of eligible participants was based on the previously discussed principles of maximum variation, appropriateness, adequacy, and data saturation. The sample of nurses with EHR experiences varied by demographics of age, gender, hospital work unit, years of nursing practice experience, level of education, computer experience (work-related and personal), length of EHR experience in the current setting, and previous EHR experience (Appendix A).

Purposeful sampling (Brink & Wood, 1998) facilitated enrollment of participants that met eligibility criteria, provided written informed consent, were able to meet with the

investigator for interviews, and varied on factors discussed in the literature as potential determinants of EHR adoption and adaptation. Random sampling is not the goal of any qualitative researcher. In addition to purposeful sampling, snowball sampling emerged as the study progressed. Snowball sampling occurs when a subject gives the researcher a referral of someone else that might be interested in participating who has a direct connection to the research phenomenon (Burns & Grove, 2005).

In qualitative studies like this *phenomenology of practice*, the researcher recruits and enrolls participants until saturation and redundancy are revealed in the data. Burns and Grove (2005) use the term saturation to mean that no new data are anticipated to emerge from further interviews. Lincoln and Guba (1985) describe redundancy as the circular repetition of emergent themes. Saturation and redundancy were indicators that enrollment of additional study participants should cease. While saturation and redundancy were revealed during the analysis of data from the first 12 study participants, sampling continued to search for a negative case. None was found, however redundancy prevailed during the enrollment of two additional study participants.

### ***Recruitment of the Sample***

After obtaining Institutional Research Board (IRB) approval, recruitment flyers (Appendix C) were posted on nursing unit bulletin boards and through e-mail blasts to staff nurses to recruit study participants. The flyers provided a short description of the study and the researcher's contact information for possible participants to obtain more details about the study. As recruitment efforts continued, snowball sampling emerged as study participants recommended participation to their colleagues. It was expected that snowballing would occur without any effort by the investigator, and it did.

Written, informed consent was required for participation in this study (Appendix D). The investigator answered all questions asked by potential study participants prior to enrolling them once their eligibility was confirmed. Following informed consent, the researcher and each participant agreed on a private venue and time for the audio-taped interview. Each interview lasted a maximum of ninety minutes. At least one but no more than two interviews were conducted with each participant in order for the researcher and

participant to complete the interview guide (Appendix B) and clarify any descriptions when necessary. As mentioned in the previous section, sampling continued until data saturation and redundancy were reached.

### ***Ethics and the Protection of Human Research Subjects***

According to Denzin and Lincoln (1998), extreme care should be taken to avoid any harm to participants when interviewing them. Traditional ethical concerns revolve around the topics of informed consent, which is consent received after a participant has been carefully and truthfully informed of the research; right to privacy, which is protection from physical or emotional harm.

IRB approval from the target institutions' Office of Research was obtained prior to conducting this study. The informed consent process in this study involved an explanation of the study's purposes and procedures, and anticipated risks and benefits. Consenting participants were informed that they could stop participation at any time without penalty, simply by notifying the investigator of their decision. Each participant was given a copy of the signed consent form to keep.

The rights to privacy and confidentiality were protected at all times. Each participant was assigned a code letter for the purposes of anonymity and no names were recorded on any of the study materials, tapes, or transcripts. The code letters, signed consent forms, and demographic information were kept in a locked file in the researcher's office. They were stored separately from the interview data to avoid any unplanned association between a person's identity, code letter, and narratives. The list of participants and any other forms with participants' names on them were not be seen by anyone other than the researcher.

The coded transcripts were shared with three qualitative researchers involved in peer validation and confirmability during the auditing of the study's data analysis processes and outcomes. Participants were assured that identifying characteristics would be altered before public dissemination of the research results and code letters or aliases will be used in all published reports. Additionally, institutional names did not and will not appear in study materials or reports of the research.

### ***Data Collection***

The primary data collection strategy in phenomenology is the interview and the principal investigator is the primary instrument for data collection (Burns & Grove, 2005). The interviews in this study consisted of the process of the interview, interview memoranda or recordings, and transcription. A semi-structured interview guide (Appendix B) was used in this study to ensure that each participant was asked the same questions. Time spent in collection of the demographic data (Appendix A) helped the researcher establish a level of rapport with the participants, which helped facilitate candor on the part of the participants. During the interviews, the researcher made every effort to maintain a neutral attitude with nonjudgmental verbal and nonverbal behaviors. Collection of the demographic data was started after the consent form was signed and a copy of the signed form was given to the participant. The interviews were audio taped to ensure accuracy in data collection and the tape recorder was placed in full view of the participants. Tape recording of the interviews started after the consent form was signed and demographic data were collected.

The interview guide used in this study was tested in a pilot study and revised. Although the interview guide ensured that each participant was asked the same questions, the interview remained a flexible process that facilitated narrative conversation (Kvale, 1966) and encouraged participants to speak freely, using their own words in response to the questions asked. The following are sample questions from the interview guide: (1) Tell me in your words how you describe what an Electronic Health Record is?, and (2) Tell me about the ways in which EHR influences your work with your patients. The detailed interview guide complete with probes is found in Appendix B.

Audiotapes of each interview were transcribed within five to seven days after the interview. The researcher reviewed each transcript for accuracy by simultaneously listening to the tape and reading the transcripts. In addition to participants' narratives, the researcher's experiences are other sources of data in this *phenomenology of practice*. These experiential data, which were recorded in the researcher's personal journal and as field and methodological notes, were also analyzed as the researcher processed the

conduct of the study. The personal journal described the researcher's reactions to events that took place during the study. Field and methodological notes chronicled observations pertaining to procedures, events, and researcher's suggestions as well as feedback on those suggestions during the course of the study (Burns & Grove, 2003).

The demographic data collected from each participant included age, gender, hospital work unit, years of nursing practice experience, level of education, length of EHR experience, length of computer experience (work-related and personal), and length of previous EHR experience (Appendix A).

### ***Data Analysis***

Data analysis procedures in phenomenology are designed to facilitate extraction of emergent meaning units or themes. Van Manen (1990) suggests that, "to do human science research is to be involved in the crafting of a text. . . to structure the meaning of the text. . . and reflectively analyze the thematic aspects of the lived experience" (p. 78). Derived from the Latin word *thema*, the word theme implies a thesis or a position (Webster's, 1979, p. 1891) that is laid down as a value or meaning. For van Manen (1990), a theme "is the experience of focus, of meaning, of point; ...not an object one encounters in the text [a theme is not a thing], but a form of capturing the phenomenon one tries to understand" (p. 87). A theme is a "structure of experience" (van Manen, 1990, p. 79). An analysis of the structure of a phenomenon, typically resulting in the emergence of a theme, is the primary outcome of phenomenological research.

Specific data analysis methods used in this study to capture meanings in the text were guided by Martins (1992). There are several steps in this data analysis process and they are discussed in the following section. Throughout the analysis of data, codebooks (Appendix E) were developed to record the movements of the researcher through the data and display the classification of meanings found among the participants' narratives about their lived experiences.

The first of several steps in Martins' data analysis procedures, called description, has special characteristics intended to mirror and express a participant's conscious

experience. To get in touch with description in context, the investigator simultaneously and repeatedly read- the transcripts and listened to the stories.

The second step is phenomenological reduction, which is a critical reflection on a description's contents. It was carried out in this study at three different moments. At the first moment, while keeping the description in its original format, the researcher placed it between brackets aiming to analyze the experience as lived without allowing personal or theoretical concepts to get in the way. At the second moment, a radical gestalt perspective was created whereby observer and subject were the focus of the description. This process consisted of arranging the data into themes, while the researcher identified significant topics in that subject's transcript, called units of significance. At the third moment, the researcher focused on the pre-reflexive sources (what interviewees said about their daily lives) and stated the meanings of the experience (psychological insights) included therein. In this moment, the interviewees recognized their own understandings of what happened to them when living a specific situation. Also in this moment, the researcher transformed the participants' everyday expressions into expressions appropriate to the scientific discourse supporting the research (Martins, 1992).

The third and last step of Martins' (1992) data analysis method is phenomenological interpretation. Learning about the phenomenon as a totality means capturing aspects of what is being revealed, aspects that may vary. Sometimes they are visible, but sometimes they are hidden. By using logical inferences, the researcher reduced the conscious experiences of the participants to elements of meaning that were empirically present in the situation and were perceived and expressed through the participants' discourse (Martins, 1992).

Using Martins' (1992) data analysis procedures, twelve sub-themes were inducted from the study group's narratives. Further abstraction of those sub-themes created three higher-order themes, which serve to classify and unify the related meanings found among the descriptions. Table 4.1 provides a preview of the findings that are presented in detail in Chapter IV.

As in any research study, the reliability, validity, and rigor of this study were examined and evaluated. In qualitative studies, criteria that address the same standards as in quantitative studies are called by different names but they are respected by the community of scholars as valid criteria that challenge the trustworthiness or truth value of the study's design, procedures, and findings. In the following sections, a discussion of this study's rigor and trustworthiness is presented.

### **Establishing the Rigor of the Study**

According to Burns and Grove (2005), five standards are needed to evaluate the rigor of qualitative studies. They are: (1) descriptive vividness, (2) methodological congruence, (3) analytical preciseness, (4) theoretical connectedness, and (5) heuristic relevance. Each will be described below.

Descriptive vividness refers to the clarity and factual accuracy of the researcher's account of the study. In this study, descriptive vividness was achieved by providing detailed descriptions of the study setting, the participants' characteristics, the data collection and analysis procedures and outcomes, and the thinking of the researcher during the conduct of the study. Each was presented in such a way as to make the reader feel that he or she actually and personally experienced the phenomena under study. The researcher compared and contrasted data derived from narrative stories, researcher's journal, as well as field and methodological notes to determine that the criteria of descriptive vividness was met. The investigator and the three qualitative researchers who audited the study concluded that it was met.

Methodological congruence denotes the agreement between the philosophical foundations and the procedural approaches used by the researcher. The scope of this standard includes: (1) rigor in documentation, (2) procedural rigor, (3) ethical rigor, and (4) auditability. To meet this standard, the researcher accurately gathered and recorded information about the study in journals, field and methodological notes, and in the descriptions of procedures and their outcomes written throughout this dissertation report. The careful and accurate recording done by this investigator allowed others to evaluate procedural rigor and auditability.

The researcher used bracketing to avoid biasing the procedures and the data. Biases are influences in a study that distort the findings away from the true or expected. Bracketing is a technique used in qualitative research to suspend or lay aside what is known about an experience being studied (Polifroni & Welch, 1999). Informed consent obtained prior to data collection added to study's ethical rigor.

The fourth facet of methodological congruence is auditability, which is the rigorous development of a decision trail and the examiner's ability to follow the investigator's vivid description to the point of being able to replicate the study. To achieve this end, the researcher reported all decisions involved in conversion of data to the theoretical schema. This reporting included adequate detail to allow a second researcher, utilizing the raw data and the decision trail, to arrive at conclusions similar to those of the original researcher.

The criterion of analytical preciseness involves the researcher's effort to identify and document the decision-making processes through which the transformations of study data were based. To meet this standard, the process of crosschecking the data with the emergent themes was conducted and described in this report.

The next standard for establishing rigor of qualitative research is theoretical connectedness. This necessitates that the theoretical schema derived from the data be clearly stated, logically congruent, consistent with the data, and attuned with the current or developing knowledge base of nursing. Theoretical connectedness was established by the qualitative researchers that audited this study's procedures and findings.

Lastly, heuristic relevance requires that the reader should have the capability of identifying the phenomena described in the study, their theoretical meanings, their applicability to nursing practice situations, and their potential influences on future research efforts. All five standards described above were met as the investigator conducted and evaluated the rigor of this dissertation study.

### **Establishing Trustworthiness or Truth Value**

In qualitative research, the rigor or trustworthiness of the study is important and different procedures are used to assess it. Trustworthiness is a general term that refers to

the overall reliability and validity of qualitative research. Lincoln and Guba (1985) provide definitions of four key concepts that can be used to evaluate the scientific integrity or trustworthiness of a qualitative study. The four key concepts are: (a) *credibility*, (b) *transferability*, (c) *confirmability*, and (d) *dependability*. All four key concepts were used by this investigator to evaluate the truth value of this study, its findings, and its conclusions.

### ***Credibility***

Credibility refers to the appropriateness and accuracy of the data sources and interpretations. According to Lincoln and Guba (1985), several techniques are associated with the establishment of credibility in qualitative research. The first technique involves prolonged engagement and persistent behavior. Prolonged engagement is the allocation of adequate time in data collection activities to have a thorough knowledge of the background of the group under study. Persistent observation refers to the investigator's focus on the aspects of the situation that are relevant to the phenomena being studied. Lincoln and Guba (1985) state that prolonged engagement and persistent observation provide the depth and richness. In this study, prolonged engagement was met using interviews with the participants until saturation was reached, which, at that point also provided the researcher with detailed background of the study group. After the interviews, meticulous recording in the researcher's journal provided a reference as to the participants' reactions, emotions, and insights on their EHR experience, thus utilizing the persistent observation technique.

Triangulation is another technique used to increase credibility in qualitative studies. Triangulation is defined as the use of multiple referents to draw conclusions about what constitutes the truth. According to Denzin (1989), triangulation is used to overcome intrinsic bias that comes from single-method, single-observer, and single-theory studies. Furthermore, triangulation also helps capture a more complete and contextualized representation of the phenomena under study. Hence, triangulation provides a basis for convergence on the truth. This study utilized triangulation through multiple data sources such as interviewing participants from different in-patient hospital

areas. Although some nuances in the participants' EHR experiences were found to be inherent to their nursing specialty and unit, the group's experiences with EHRs across the target facilities were found to be similar, thus generating the themes.

The second technique related to credibility is external checks, which includes peer debriefing and member checks. Peer debriefing includes meeting with objective peers to review and explore different aspects of the research study. In this research, the investigator regularly met with mentors and other expert qualitative researchers to discuss important parts of the study. Member checks are also sometimes used to establish the credibility of a study. They usually involve eliciting study participants' reactions to initial study findings and interpretations during meetings with them following the data analysis phase of this study. Although Lincoln and Guba (1985) consider member checks one of the most important techniques to use to enhance credibility in qualitative research, descriptive phenomenologists do not use member checks to establish credibility, as they think that this is outside the role of the participant. Furthermore, Martins' method (1992) of data analysis, which was utilized in this study, does not require member checks.

The third technique of establishing credibility is to seek disconfirming evidence or negative cases. This approach was attempted by sampling beyond the points when data saturation and redundancy were reached, even though descriptive phenomenological research approaches to not require that this be done. It is said that disconfirming evidence is not suitable for phenomenology because the main goal is description of meaningful experiences and their interpretations through the filters of the researcher.

The last technique to establish credibility is researcher credibility. In qualitative research, the investigator is the data collection instrument and is involved in the analysis procedure. Thus, the researcher's training, qualifications, and experience are essential to establish confidence in the data. To establish researcher credibility in this study, mentors and expert qualitative consultants determined that the investigator conducted authentic, original research and was well prepared to conduct and evaluate the study's procedures.

### ***Dependability***

Dependability, which is the counterpart of validity in quantitative research, is another facet of trustworthiness. To establish dependability, stepwise replication and inquiry audit are two suggested techniques. Stepwise replication requires that the participants be divided into two groups and at least two researchers are needed to conduct the study separately and compare the results. This technique was not appropriate to use in the evaluation of this study because the research tradition of phenomenology only involves one researcher interviewing the participants. However, at another time, dependability could be challenged when other researchers choose to replicate this study.

Another method used to evaluate dependability is the inquiry audit, which was suitable for use in this situation. An inquiry audit entails the use of an external reviewer to scrutinize the data and all pertinent documents. Three qualitative researchers examined research-related documents and validated the data. An auditable trail of data and decisions were maintained throughout this study.

### ***Confirmability***

Confirmability refers to the objectivity and neutrality of the data and involves procuring the agreement of two or more independent people about the study's accuracy, relevance, and meaning. Bracketing was used in this study to keep the researcher's preconceived notions separate from the data collected and analyzed about the phenomena under study. A reflexive journal was used to ensure that bracketing was maintained throughout the study. Another method associated with confirmability and dependability is the inquiry audit discussed above. The researcher maintained an audit and decision trail, which is a systematic collection of documentation that allows an independent auditor to come to conclusions about the data. The researcher established an audit trail by maintaining accurate records of her movements throughout the study. Recordings that establish confirmability are the raw data, field and methodological notes, codebooks, reduction and analysis notes, personal notes, and final reports. Subsequently, as documents were gathered, three auditors proceeded to review all the documents and audited the trustworthiness of the data and meanings attached to them. A decision trail

was created to document the researcher's decisions and rules for classifying data and explaining inferences in the analysis.

### ***Transferability***

Transferability of qualitative studies is similar to the generalizability of quantitative research in that it occurs when the findings from the data can be applied to other settings or groups. The investigator in this study provided adequate information in the report so that other researchers can apply the results to other situations. According to Lincoln and Guba (1985), the research must provide a thick description of the research setting as well as the process observed during the research project so that other researchers can transfer the research to similar settings.

This concludes the discussion of methods and procedures used in this study. Findings are reported in Chapter IV and conclusions and recommendations are found in Chapter V.

### ***Summary***

As this research explored nurses' experiences with EHR in the context of their clinical setting, phenomenology of practice was employed. The research took place in a large university medical center, which involved inpatient staff nurses working in five member hospitals. After IRB approval, recruitment of subjects was done through flyers, snowball, and e-mail blasts. The primary source of data was interviews using a semi-structured guide. Martins' (1992) technique for data analysis was utilized. In order to establish rigor, the five standards according to Burns and Grove (2005), namely: descriptive vividness, methodological congruence, analytical preciseness, theoretical connectedness and heuristic relevance were met. The four key concepts of scientific integrity or trustworthiness (Lincoln & Guba, 1985) such as credibility, transferability, confirmability, and dependability were also addressed.

## **Chapter IV: Findings**

The findings of this phenomenological study are presented in this chapter. The results are in the forms of themes and sub-themes that represent common meanings and interpretations of the nurse-participants' experiences with EHR. Specifically, the themes and sub-themes reveal the participants' subjective perspectives about encountering and using EHR, the influences they believe EHR has had upon nursing practice and patient care outcomes, and suggestions they identify as being essential to EHR implementation and evaluation.

Shared meanings about the nurses' lived experiences with EHR emerged from the analysis of narratives collected during interviews with the participants. Data analysis procedures (Martins, 1992) were described in detail in Chapter III. Samples of Codebooks 2 and 3 for theme 2, displayed in Appendix E, reveal the inductive coding processes used and the cognitive decisions made by the investigator during data analysis and interpretation. The findings discussed in this chapter, as themes and sub-themes, are supported throughout by descriptions or instances of data found in the narratives. The actual words of the study participants, used in this way, provide evidence that the findings represent the perspectives of the participants rather than the personal views and biases of the researcher.

The presentation of the findings in this Chapter is organized according to the three research questions that guided this investigation:

1. What are the lived experiences of nurses working with EHR?
2. How do nurses describe the influence EHR has on nursing practice and patient outcomes?
3. What factors do nurses describe as essential to EHR implementation and evaluation?

Twelve sub-themes were inducted during the analysis of the study group's narratives. Further abstraction of those sub-themes created three higher-order themes, which serve to classify and unify the related meanings found among the descriptions.

Table 4.1 provides a preview of the findings that are presented in detail in the text of this chapter, immediately following the description of the study sample.

Research Questions	Themes	Sub-themes	Descriptions (instances) from the Narratives
1. What are the lived experiences of nurses working with EHR?	Phases of EHR Experiences	1. Getting Ready 2. Go-Live 3. At Present	<i>“apprehensive”</i> <i>“problems and plusses”</i> <i>“getting better”</i>
2. How do nurses describe the influence EHR has on nursing practice and patient outcomes?	Dimensions of EHR Influence	1. Time 2. Efficiency 3. Safety 4. Nature of Work 5. Communication and information access	<i>“gives a bit more time to spend with patients”</i> <i>“helps focus more on care”</i> <i>“cuts back on a lot of mistakes”</i> <i>“follows the workflow”</i> <i>“more direct, we can look at and see the same thing”</i>
3. What factors do nurses describe as essential to EHR implementation and evaluation?	Future Improvements	1. Training 2. System Development & Implementation 3. Approach 4. Equipment	<i>“make sure the person has some computer experience”</i> <i>“nice to have input from actual users”</i> <i>“phased in...roll things out quicker”</i> <i>“updating equipment”</i>

Table 4.1. Preview of Findings

### Description of the Study Sample

The sample in this study was made up of 14 nurses who met all eligible criteria and willingly gave written informed consent. Five participants were recruited through flyers posted in clinical areas of the hospital system. Four participants learned about the study through e-mail blasts, and five participants were recruited through snowball sampling after co-workers who completed the study encouraged them to contact the investigator. Table 4.2 below shows the demographics of the study group.

Characteristics	Frequency	Percentage (%)
<b>A. Gender</b>		
• Female	11	79
• Male	3	21
<b>B. Age</b>		
• 55 and up	5	36
• 45-54	3	21
• 35-44	4	28
• 25-34	2	14
<b>C. Level of Nursing Education</b>		
• BSN	8	57
• ADN	6	43
<b>D. Duration of Staff Nurse Experience (<i>in years</i>)</b>		
• 30-39	3	21
• 20-29	1	7
• 10-19	8	57
• 0-9	2	14
<b>E. Nursing Practice Specialty</b>		
• OB	4	29
• Telemetry	3	21
• ICU	2	14
• Psychiatry	2	14
• OR	1	7
• Medical-Surgical	1	7
• Pediatric	1	7
<b>F. Hospital Affiliation</b>		
• Adult Acute Care	6	43
• Maternal-Child	3	21
• Psychiatric Care	2	14
• Prison Health Services	2	14
• Children's Hospital	1	7
<b>G. Duration of EHR Experience (<i>in months</i>)</b>		
• 13 and up	11	79
• 0-12	3	21

Table 4.2 Demographics of Participants

Of the fourteen participants, eleven (79%) were female and 3 (21%) were male. The nurses ranged in age from 26 to 60 years with a mean age of 46 years. The majority of the study group held baccalaureate degrees and the others had associate degrees in nursing. In addition, most of the participants (57%) had between 10 and 19 years of staff nursing experience prior to their participation in this study. The nursing practice specialties of the study group were in-patient obstetrics (OB), telemetry, intensive care (ICU), psychiatry, operating room (OR), medical-surgical, and pediatrics. Most

participants were employed at a large university health center in the southwest United States where five affiliated hospitals provide care to adults, children, pregnant women and babies, men and women serving time in state prisons, and the elderly.

The largest percentage of the study participants (n=11; 79%) had more than one year of EHR experience while the remaining three (21%) had one year or less of EHR experience. All members of the sample stated that they use EHR in the workplace primarily for the tracking and delivery of patients' medications, entering and checking doctors' orders, and monitoring results of patients' laboratory tests.

Since this study commenced, additional capabilities of the EHR system were added. However, to control for bias and to ensure that each participant had equal exposure to the basic EHR functions, nurses who were newcomers to the nursing staff or who had advanced training in the use of multidisciplinary EHR modules were not eligible to participate. A complete description of eligibility criteria, consent, enrollment and the interview procedures are found in Chapter III.

### **Central Findings Organized by Research Questions**

The themes, sub-themes, and the descriptions that support them are summarized and presented in Table 4.1. In this section, detailed findings are presented as answers to the research questions. As described fully in Chapter Three, data analysis methods used in this study were guided by Martins (1992). Therefore, the findings presented here are thematic representations of the study group's conscious EHR experiences accompanied by sub-themes that capture the participants' significant insights and understandings about those EHR experiences.

#### ***Research Question 1***

What are the lived experiences of nurses working with EHR?

Theme I, *Phases of EHR Experiences*, represents the gestalt of meaningful reactions, responses, and adjustments to EHR that the study group revealed during dialogues about their involvement, over time, with the new computerized health information system (EHR). The three sub-themes that collapsed to create *Phases of EHR Experiences* were, "getting ready," "go-live," and "at present." The individual sub-

themes, supported by descriptions in the narratives, reveal the patterns in perceived knowledge and feelings that the study group experienced during the introduction and implementation of EHR. The labels of the sub-themes emerged from the data and appropriately capture the meanings the study group ascribed to their EHR experiences as they tried to make sense of what was happening to them.

The first sub-theme, “getting ready,” reveals the patterns of feelings and behaviors that the study group reported experiencing when they learned that EHR was about to become part of their everyday work lives. As this sub-theme implies, the nurses actually prepared themselves for EHR implementation in a couple of ways. In anticipation of this impending change, some took it upon themselves to engage in voluntary activities such as asking a child to show them what computers can do. Others prepared themselves by accepting that they had no choice but to enroll in employer-sponsored mandatory training.

During this “getting ready” phase, apprehension was the dominant feeling the study group reported experiencing when the news of EHR implementation was announced by hospital and nurse managers. Several instances of data or descriptions support this sub-theme. A 34-year old nurse with 12 years of nursing practice experience discussed her apprehension in the context of the forthcoming change. She said, “As in any change, there’s that certain worry about getting used to computer charting instead of on paper” (C60-62). An older nurse (44 years of age) with many more years of experience (27 years) mentioned what it was like for her to take on new computer skills in anticipation of EHR implementation. She stated, “Because I’m an older nurse, I don’t have the computer skills the younger ones do; I didn’t grow up that way so I was initially very intimidated” (B85-87).

Study group members, who reported taking the initiative to prepare themselves for the impending change, discussed some of the ways they did that. For example, a 55-year old female nurse with 30 years of experience said, “I started getting people [who were] more familiar with computers to show me how to do things” (A96-97). Another participant told about how she tried “to get better acquainted with computers” prior to the

actual EHR implementation (B113). Two of the male nurses in the study group, ages 39 and 58 years, who were actively involved with the EHR planning committee, reported their experiences that included helping others. The younger one remarked that he felt like he was responsible to bring people and computers together in a non-threatening way. He said:

“I was the representative of the department working with the Epic people. When they came to instruct us, I was there to sort of communicate with the very anxious 75-year old nurse and the very knowledgeable ‘hip’ but can’t figure out why she doesn’t understand the computer expert, so I was the liaison between the two of them” (H61-66, 68).

The older male nurse described his own approach to the change and the ways he helped others when he said:

“I just stayed involved...I just try to stay up-to-date with the current plans for the institution. I wanted to learn and kind of get the inside scoop on what they were planning on doing because I’ve always felt like if you understand why things are developed a certain way, you can help other people understand better so people don’t have as many negative views about it” (K226-236).

The narratives in this study also provide participants’ descriptions of their experiences with the mandatory training offered by the institution in anticipation of EHR implementation. For example, the hospital provided the participants with four to eight hours of hands-on training in each module to prepare them for the system change. There were also additional classes that offered more in-depth information for superusers. Superusers were nurses who took a special interest in EHR and came forward to learn more so they could assist others and generate and sustain positive attitudes towards the change. One nurse who was one of the superusers stated that one role of superusers was to promote acceptance of EHR among staff. She said:

“They had superusers to try to get you ahead and go to class, come back and tell everybody what we had learned – ‘it’s not gonna be bad’, and try to make people less fearful of it. It’s effective because if you’re positive about it, you know other people will not be so worried” (J339-342, J344-345).

Despite the preparatory activities, classes, and assistance from superusers, some of the participants described their experiences with EHR training as, “a little bit overwhelming,” and “rushed.” One nurse remarked:

“It was a lot of stuff to remember all at one time. You only get it once and it was probably a few weeks before you actually started using the system. So it’s not like you can remember much information a few weeks ago to be right there when you have a patient, so it was a rough change” (C129-133).

Another common description of training offered by the study group was that it was “not nurse-oriented.” A 39-year old ICU nurse stated:

“The nurses were trained how to do what the physicians were supposed to be responsible for, so a lot of putting in orders and just in general navigating through things, identifying problem lists and things like diagnoses. As nurses, we don’t really do much of that, they really don’t like us to put in any verbal or telephone orders either. So the training, although it was required and fairly extensive, most nurses came away from the training in my opinion feeling like the training would have better suited the physicians” (K245-253).

The second sub-theme, “go-live”, captures another *Phase of EHR Experiences* described by the study group. “Go live” emerged from stories about the period of time when actual EHR implementation took place. Preparations and trainings had ended, for the most part, and the realities of using the system confronted the participants each day of their work lives. Two common experiences during “go live” that dominated the narratives were revealed in participants’ descriptions of *problems* and *plusses*. The dominant ‘problem’ that most of the study group discussed was something that interrupted the efficiency and flow of their work with patients. Specifically, the computers on wheels (COWs) were described as “not working” (A311) (J107), “freezing up all the time” (C147) (G213), “crashing quite often (B77)”, and being “a lot slower” (F233). In addition to these problems interfering with possibilities for a smooth “go live” phase of EHR implementation, many of the participants complained about there not being a sufficient number of computers to go around, considering all of the nurses, doctors, students, and others who needed to access the computers while on the unit. One participant captured the sentiments of the study group when she said:

“Some of the challenges on the unit are especially first of the morning, all the new docs and students come through, then there are only a few computers in the station. We have the portable computers or COWs on the outside and the COWs are very slow. A lot slower than what you are used to doing inside and sometimes there is no access. All the students want those computers and you have to wait

your turn or try to knock them off and say, “Hey let me finish up and then you can have it” (F215-221).

Other common *problems* revealed in the narratives were related to insufficient access to the computers, causing nursing staff to work longer hours in order to get their work done. The following instances of data reveal the frustration the study group felt about ‘problems’ during EHR implementation that were precipitated by too few working computers, restricted access due to demand, and individual differences between users’ capabilities. A 34-year old female nurse with a lot of experience with computers in her daily life remarked that:

“[We were working] longer hours. It [EHR] was time consuming. Some people are less computer literate than others so they had a harder time. Somebody had to almost stand behind his or her shoulder and teach him or her how to use it. So it was a change, definitely” (C154-157).

Worries about how EHR was affecting patient care were also heard in the voices of the participants. One of the female nurses pointed out that for the first time in her 11-year nursing career she was facing a ‘problem’ over which she had little control. She said:

“It was total chaos...very frustrating because you try to do your patient care and you’re trying to learn this and you can’t give medication until you get this and you can’t. So it did affect patient care a lot that day but you do have to learn it at some point” (M100-104).

Perspectives about how to manage the chaos were expressed by several in the study group. A 55-year old participant captured the hopes the study group held for one day having better control over keeping patients as their first priorities and dealing with the computers after that. She said:

“Right at first, it [EHR] was taking time away from patient care because we were worried about getting in the system and making sure we documented, but now once we’re used to the system we take care of our patients and then the computer.” (F258-261)

Participants also pointed out that during the early stages of EHR implementation, their productivity decreased. Most attributed this phenomenon to their pre-occupation with the new EHR and their learning curves associated with it.

In addition to problems of access, differing levels of users' abilities, and loss of productivity, participants who worked in the women's hospital ( $n=3$ ) worried that the computerized system was a major source of patient care errors. They found this to be especially true when patients were transferred to other units from antepartum, labor and delivery, and postpartum areas. Types of patient care errors that concerned study group members were described by them as being related to process problems internal to the EHR system programming. That is, duplication of doctors' orders seemed deliberate rather than accidental when patients moved from one unit to another. Participants' fears and frustrations with this programming problem focused on the potential to injure or harm patients if good communications between the nurses on the sending and receiving units failed. One of many descriptions found in the narratives that capture concerns about this problem follows:

“Sometimes, two narcotics are ordered twice. I think it's because sometimes the doctors are putting the orders in twice and they're being put into the medication part twice, so we need to take that off because nursing can make mistakes. If someone gave narcotics up here [the other unit] and then we gave it again down here, that's double dose. So I've had to send a message to the pharmacists and say this is double. You need to take off one of them. Sometimes they do and sometimes they don't, but nursing can't do that, so that makes it difficult” (I295, 298-294).

In this women's hospital, the work processes associated with entering and transferring doctors' orders involve several different health care personnel (doctors, nurses, and midwives). Taking this problem to management has started a plan to correct it, however the participants remain frustrated by an apparent lack of compliance among involved staff. Despite problems discussed by the study group about EHR implementation and use, they also described many positives and “plusses” about the system's influences upon nursing practice and patient care outcomes.

Positive experiences, classified as *plusses* within the “go-live” sub-theme, were also revealed by the study group. Participants articulated their appreciation of the quality of both the vendor and in-house clinical application support team members during the initial stage of implementation. The following are the instances of data that depict their positive views and *plusses*:

“We had 2 sometimes 3 people [“red shirts” or clinical application support people] hanging around. There was plenty of help and if we didn’t have help or if they weren’t right there all we had to do was call a number and somebody would come right over” (E269-271).

“They were there. They were a resource that we could go to at all times. Anytime during the day or night and they’d come up and check and make sure everything was ok” (F283-285).

“I’m impressed that they’re pretty good at helping us get it in place... I know in-house when we call and say we’ve got a concern with this issue or that issue, it’s just taken care of (H358-361)”.

Teamwork was a special contributor that helped the study participants cope with the changes they had to make to adjust and master the EHR. The positive experiences this teamwork approach created were attributed primarily to people and strategies involved in clinical application support, staff training, and supplemental staffing. Instances of data that support the study group’s positive perspectives of and appreciation for teamwork are found below:

“We [nurses in the unit] are a network, so if there’s something I’m having trouble with, I’ll ask them. They help me and I’ll help them so we get through it ok. Teamwork!” (D136-138).

Being able to count on each other and ensure that no patients were harmed during EHR implementation were seen as *plusses* of teamwork, as noted in the following description:

“Everybody did pull their load of work and we got guys [clinical application support] helping us, so I think we did fine. No major thing happened so that’s the good thing. No break downs, nothing” (G262-264).

Knowing that each colleague had the same mandatory, employer-sponsored training prior to implementation brought out a sense of acceptance of each other that was recognized as

a plus when EHR changes challenged the study group members. As one pointed out, “Most of them (colleagues) were accepting to it because they’ve been through the class” (E377-378).

In addition to knowing each of them had the same training, the additional staff that was provided to support the change and the superuser infusion into the mix were seen as *plusses* by the study group. One of them summarized how well she thought the changes went because of staff support:

“I think it went pretty smooth because we staffed up. We knew it was going to be a big deal and there was a lot of help there. I was a superuser, so I already knew. I didn’t think it was actually any problem because it’s so easy you know – your medications are already printed you just click. I think it was pretty good” (J173-178).

Other positives and plusses that were of critical importance to the study group were related to changes the EHR made to their practice with patients. While earlier references to patient care issues focused on protecting patients from harm while system-related EHR problems were identified and smoothed out, the study group members also discussed the real and potential positive changes and benefits EHR had for their practice with patients. For example, a description from the narrative of a 58-year old nurse with 30 years of experience follows and suggests that EHR actually improves patient safety. He said, “I don’t think the quality of the care overall changed. I think people were a little bit more cautious about making sure that the medicines they were giving are correct” (H270-272).

While study group members spent a lot of time reflecting upon their past experiences with EHR preparations and implementation, they also devoted themselves to appraising how they were doing presently. Their narrative descriptions of these experiences, when analyzed, led to the emergence of the third sub-theme of *Phases of EHR Experiences*, called “at present”. The “at present” sub-theme captures what the participants discussed as their current perceptions and descriptions of the EHR system, their current levels of confidence using the system, and their thoughts about support from

management. Overall, and as will be seen in their descriptions, study group members in this phase were *getting better* at using EHR.

When asked about how they would define EHR, the most frequent reply given was that it is an electronic document of the patient's personal health record. One nurse offered a more comprehensive and patient-centered description when he stated:

“An EHR is essentially a modern version of what we used in the past to document the care of patients while they're in inpatient and outpatient settings. It's utilizing more technically advanced methods of documenting these things in an electronic fashion and just helps to streamline patient care. It's making use of technology to provide better care, more timely care, and consistent safer care to patients” (K3-9).

Asking participants to define or characterize EHR was important to this study. It sets the stage for participants to begin discussing their experiences with EHR after the initial chaos of implementation and after they have had a chance to form an opinion of it. Based on the narratives, there is overwhelming evidence that study participants like the system. Common descriptions identified in the narratives include about “at present” appraisals of EHR were, “very user friendly,” and “very valuable.” An ICU nurse gave the following remark in the context of how he feels about EHR “at present”:

“I love it. I really can't imagine going back to the pen and paper methods. It's safer, it takes less time, you know – consistency with medication reconciliation, those sorts of things are built in to the process. You know being able to pull up a patient's chart review and see if they've gotten immunizations in the clinic is invaluable. I think it's really going to shine when we have all of the pieces put in; everybody's using the same tool. I think it's really going to be awesome and I just can't imagine going back to the other way that we used to do things” (K387-395).

Levels of EHR user confidence were found to be high among the study group. The nurses felt that they had learned the system well and were able to navigate the different modules within EHR. However, there was less consistency in the narratives about experiences with support from management during EHR selection and implementation decisions. While most participants felt supported by their direct managers and praised the extra staff and superusers that were provided, some expressed disappointment that they were not included in processing the decisions made at the upper

management level. Below is one instance of data that represents some of the positive experiences study group members had with their managers in the context of EHR support:

“Our manager’s great. She stands behind us and she does help and listens. (B216-217) ...makes sure that somebody from each shift has been named as a superuser and from each matrix because we work opposite each other. So, usually she makes sure there’s somebody on each of those shifts morning, evening, and for both matrices.” (B295-298)

Other study participants specifically saw their managers as being very important players in the success of EHR. For example, a nurse who worked in ICU for 11 ½ years before EHR implementation described the significant role his manager played when he said:

“She (nurse manager) was a vital person to the success of the implementation just because of her positive attitude and her willingness to work with all these disciplines, because it took a lot of effort prior to implementation. A lot of man-hours went into making sure that we have all our I’s dotted and our T’s crossed...tremendous managerial support!” (K371-376).

Members of the study group who held less positive and less favorable opinions of their nurse managers’ support of EHR were in the minority. However, their experiences are important to the success of future changes in nursing practice and patient outcomes and they warrant inclusion in this report of findings. One of the more experienced nurses in the study group was not content with the performance of his manager during EHR implementation. His concern was that staff ‘buy-in’ takes time and is critically important to any change, yet his nurse manager did not provide the support needed to bring about the necessary changes. He said:

“I might see her (nurse manager) 2 or 3 times a week but definitely not in a supportive role. [She] did little if any exposure to the nuts and bolts of operation of what I do or my colleagues do...[the nurse manager was] not there” (N65-66, 70-72).

Amidst mixed opinions found in stories about how supportive nurse managers were during EHR implementation, the majority of the study group believed they should have had more say in discussions and decisions about adoption of EHR and in making the choice of EHR programs and vendors. Apparently, upper level management decided the

choice of EHR software, which some study participants suggested was a problem when it came to EHR acceptance by staff. Participants practicing in ICUs suggested that they had more roles in EHR decision-making than nurse participants in other specialty areas and hospitals within the medical campus.

The next section presents a theme and sub-themes that emerged from narrative data about how members of the study group described the influences EHR had on their practice with their patients and on outcomes of patient care. This next theme, *Dimensions of EHR Influence*, and its sub-themes provide answers to research question two.

### ***Research Question 2***

How do nurses describe the influence EHR has on nursing practice and patient outcomes?

Theme II, *Dimensions of EHR Influence*, represents the gestalt of the study group's interpretations of the many ways in which EHR specifically affects practice. The five sub-themes that explicate the dimensions of EHR influence emerged as, "time", "efficiency", "safety", "nature of work", and "communication and information access".

The following paragraphs address the theme, its sub-themes, and supportive descriptions that answer research question two.

Initially, the EHR took some time away from patients because the nurses had to learn the new system. After they had familiarized themselves with the EHR and attained a level of confidence in navigating the system, most of the nurses in the study said that the EHR gave them more "time" to spend with patients. Many narrative descriptions of "time" that EHR allowed for more patient care and more convenient documentation were found in the stories of the study group. To illustrate this, a 46-year old nurse with 2 years experience using EHR said:

"I think it [EHR] gives us a little bit more time. There are some steps that we don't have to do because it's all on the EHR. We don't have to write out our med sheets. Everything's a little bit easier. There's no more paper work involved. The lab slips are generated. The referrals are all generated. Nothing has to be done by hand anymore, so that is saving time. (I12-17) ...it gives us more time to be able to care for the patient rather than doing these things online and looking things up, I mean doing things by hand, manually" (I19-21).

Another participant with fewer years of nursing experience but more years of personal computer use before EHR was introduced in the workplace said:

“Now that it’s just right there on the computer, when the doctors put the orders in, it’s readily available. I don’t have to spend time doing that, therefore it gives me a little bit more time to spend with my patient and taking care of them” (E34-37).

Although the EHR was described as a tool that gave the study group members more “time” with their patients and helped them focus more on patient care, one of the male nurse participants had a different point of view about what nurses are prone to do when they have “time” on their hands. He said:

“I’ve been a psychiatric nurse for 30 years. This has been one of my experiences: when there’s more time we [nurses] tend to do less...they’re [staff] not going to spend anymore time [doing patient care], they’re going to take longer lunch breaks, they’re going to socialize with their peers more, so the opportunity is there. . .” (H120-121, 417-420).

For this participant, having more “time” to do hands-on patient care does not necessarily mean that all nursing staff will choose to spend it that way. Ultimately, good use of “time” is the nurse’s decision, although nurse managers may have other things to say about it.

The second sub-theme in *Dimensions of EHR Influence*, “efficiency”, organizes the descriptions used by study participants when they discussed how EHR helped them stay focused on the care of individual patients. The group expressed that the system is more detailed and easier to use, making their focus on patients’ needs more efficient when compared to former paper and ink systems that required nurses to look for and gather patient data from a variety of places. The following instances of data illustrate descriptions of “efficiency” that is affected by EHR. The first is from the story of an operating room nurse. She said:

“It [EHR] reminds you of certain things when you’re looking at your documentation on the computer. It informs you time-wise of how efficient turnover is. It has a screen, which reminds you of what you need for the case. You can actually pull down your trays and your supplies needed for a certain cases - they’re surgeon specific. I think in terms of care it makes it more efficient.” (C12-18)

In the specialty practice of psychiatric nursing, one of the nurses offered that the “efficiency” of EHR is found in how, “It [makes it easier] to get access to what medications the patient can have. It’s easier to chart it. It’s easier to keep track of it.” (H12-13)

In addition to EHR influences upon “time” and “efficiency”, most of the study group described how EHR also increases patient “safety”. “Safety” emerged as the third sub-theme supporting the dimensions of EHR influence when descriptions, collapsing in the context of EHR’s ability to cut back on a lot of mistakes, dominated the narratives. That is, most of the study group verbalized that the EHR system is easy to read, accurate, and features alerts and highlights that tell you to address specific issues (e.g. medication allergy, over dosage, etc.). The following instances of data illustrate the various descriptions of safety that were facilitated by the EHR. A 55-year old nurse practicing for 30 years stated:

“We used to write all our medications out and recopy it every night. Now with the EHR, we just have to click on it... less chance for error because the pharmacist is putting it in there, the pharmacist has verified it” (A332-333, 336-338).

Reducing errors that might otherwise cause harm were commonly mentioned “safety” measures influenced by EHR. Another nurse participant with 27 years of experience captured the opinions of the study group when she talked about how many checkpoints EHR provides in the process of carrying out orders for patients’ medications. She said:

“It’s nice that in order to go to certain steps especially for pharmacy you have to have the alerts and it will highlight it. It’s nice that it does those kinds of things so you don’t forget what information that needs to be in there. For allergies, it highlights telling you, you need to address it or to renew the allergies to make sure that you’ve checked each time because a new allergy may have come up” (B269-274).

Comments about error-reduction not only addressed “safety”, but mirrored descriptions offered during the emergence and display of earlier sub-themes related to “time” and “efficiency”. For example, another participant said, “Your risk of dosing somebody with something that should not be on the EHR is reduced significantly. So to me, it’s a much

safer tool than the former pen and paper nursing kardex type stuff that we used” (K28-31).

As participants in the study spent more time with EHR following implementation, they found that it not only influenced “time”, “efficiency”, and “safety”, but it also had a more global effect on the total “nature of (nurses’) work”. The primary nature of the descriptions that contributed to the emergence of the fourth sub-theme, “nature of work”, revealed how positively the members of the study group viewed the parallels between the EHR system and the natural flow of work on the nursing units. That is, found in the narratives are instances or descriptions that indicate how EHR conveniently influenced nurses’ abilities to get their work done. Using EHR did not require changing work patterns or routines.

Participants stated that EHR made it easier to find out laboratory results, get medications to patients, and document without having to chase down the patient’s chart all the time. Even the work that has to be done in a preparatory manner when a nurse is about to admit a patient to the unit was described as easier and more efficient. For example, one participant described how EHR facilitated the nature of the work she had to do to prepare to receive a transfer patient. She said:

“When I first get a patient or when I know I’m getting a patient I usually look it up as far as their demographics, ... I get ready for the paperwork to get the patient up and the problem list, what he has had in the past to see where it stands on our unit or if he’s coming in with chest pain or if he’s had chest pain before and the previous medications he was on, we can review that [before we see the patient]” (F11-17).

Even regular tasks that nurses typically perform to assess their patients at the beginning of their shifts were more conveniently carried out with EHR, as was evidenced when one of the participants said, “I start my shift out looking at the computer, so that I know what my plan of care is going to be before I actually go assessing” (E25-26).

Important and valued parallels between the nature of work and the EHR system were also discussed by participants in the context of 8-hour and 12-hour shifts. Previously, the EHR was implemented using an 8-hour schedule, but nurses in the study group who worked 12-hour shifts, reported that the EHR system was configured

accordingly. The nurses were pleased about this workflow congruency. As a 49-year old nurse stated, “We usually work 12-hour shifts and at first we were at 8-hour shift increments - that did not work very well and they changed it to the 12-hour shifts, which makes it much better. I like that” (J89-91).

A labor and delivery nurse also agreed with the majority of the participants about how well the EHR system follows the workflow on their unit. However, in this particular unit where patient turnover is much faster than on other units, sometimes nurses rely on paper documentation (e.g. fetal monitoring strip, etc.) to keep up with the work. One of the nurse participants clarified that this phenomenon was not the fault of EHR, but instead an outcome of rapid patient turnover. It was not always possible to enter and access data in EHR when demands for the constant transfer and relocation of patients were the priorities. The following is an instance of data that illustrates this:

“I think [EHR] works well within the flow during my shift (G51). But you know it’s not realistic sometimes. They want you to do everything, but you can’t because they want the patient moved when there are 10, 20 patients backed up in the triage room, you have to hurry up and get them out. You can’t say, “I’m not done yet doing my documentation in the computer! (G91-94) [When the] turn over is fast, sometimes we kind of tend to just let go of it since we have the paper documentation” (G53-55).

In this case and on this unit, it was made clear by participants that EHR was not at fault. Instead, they described ways in which the nature of the work on their unit could be taken into account when making modifications in EHR in the future. These are discussed in more detail in Chapter V.

At the heart of any well-run nursing care unit are sound communication policies, practices, and habits. The importance of communication was stressed by members of this study group, with such regularity and substance, that their descriptions collapsed, in the context of *Dimensions of EHR Influence*, to form the fifth sub-theme called, “communication and information access”. The study participants reported that EHR has enhanced the communications between nurses and other health care personnel (e.g. doctors, pharmacists, allied health, etc.) as well as increased information access, consequently improving patient care. This is captured in the instances of data that follow.

One participant, who is a practicing nurse for 36 years said: “Well, I think it’s [communication is] more direct because everybody sees the same thing. I don’t have to flip through progress notes to see, it’s just right there in the computer and everybody can view it” (D35-37).

Many of the study participants discussed communications and information access in the contexts of other sub-themes of “time”, “efficiency”, and “safety” that have already been addressed in the findings of this study. It was apparent that communications could not be separated from the timeliness, efficiency, and safety aspects of nurses’ daily work. As one participant said:

“Communication between nurses and [the] pharmacy seems to be getting better. The turn around time between sending an eMAR message and getting the medication up [is better] and also on the consults that we put in. I think it’s a big time saver because we send it off and we know that they’ve gotten it...” (L58-63).

The broadcast style of communications that EHR offers was cited by many participants as contributing to patient safety, because everyone involved with the patient gets the same information at the same time. A telemetry nurse with 2 years EHR experience described this communication style further:

“The doctors can put in the orders prior to them even coming to the floor and they can put them in any place that has the system. (F34-35) Some of them even have them at their homes, so you keep checking and they keep a better understanding of what’s going on and lab puts in the results of any lab work, so they can usually check or we check. On the cardiac unit, a lot of the people are on drips and stuff and we have to keep a view of what their lab work results are compared to what their drip is going at” (F37-42).

A pediatric nurse for 4 ½ years again explained the ease of use and safety that is influenced by EHR. She contrasted the old and new communications and information systems and said:

“With the older system you couldn’t document when you gave your drugs. You had to write them off initially, whereas with the new system, I can go in there and

verify my drug amounts and I can just click and I've signed it off and I just really like that. I like being able to have easy access to it and I don't have to go find my chart if somebody else has got it doing something with it. I can just look right there on the computer, and say, this is the drug I'm giving, this is the right dose, right patient and all that stuff" (E42-49).

Given the sub-themes and descriptions of *Phases of Nurses' Experiences with EHR* and the descriptions of *Dimensions of EHR Influence*, interpreted and presented from the narratives of study group, it became clear that the participants had gathered a lot of insight and wisdom into how future EHR designs and implementation plans could be improved. The emergent theme and sub-themes that describe the nurse participants' recommendations arrived at through reflection upon their lived experiences are discussed in the next section and answers to the third research question posed in this study.

### ***Research Question 3***

What factors do nurses describe as essential to EHR implementation and evaluation?

Theme III, *Future Improvements*, represents a cluster of emergent meanings found in the narratives that showed what the study group perceived as important to future implementation or EHR system upgrade. This includes the factors that need to change and how they need to be different. As described by the study group, four sub-themes comprise the types of future improvements they recommend as vital to EHR success. Those four sub-themes are "training", "system development and implementation", "approach" and "equipment".

The first description of a *Future Improvement* that the study group believed was important in the area of "training" future nurse-users of EHR was the suggestion to "make sure the person has some computer experience." Along with consensus about this suggestion, many study group members voiced that just before training begins, a needs assessment should be conducted in order to determine the computer skill level of each nurse. In response to the employer's assessments of computer skills and competencies of future EHR nurses, the study group suggested that a general computer class be offered to reduce each nurse's EHR learning curve at the time of actual EHR implementation. The following statements found in the narratives of one 49-year old and one 58-year old

participant summarize the general sentiments described across the study group. The younger one said:

“Taking a general computer class [before the training would be helpful] especially if you’re not --, most of the young people nowadays they grew up with it. Some of the older nurses like me did not. I didn’t use a computer ‘til [I started working at] the hospital. I just never had access before that. A general computer class would be helpful just with the general things” (B306-310).

The older participant’s comments took into account more than the ages of the nurses who are going to work with EHR. He considered that physical condition and how people learn are additional factors. He said this about computer training:

“They might take a look at things that are going to relate above and beyond learning the system like just general computer awareness and comfort. Look at your population and if everybody you’re working with is under 25, they all know computers and they’re all comfortable. A lot of them are you know, 60 and older, and they may not be that comfortable. Look at your population you want to teach – figure out kinda ahead of time whether you send out a little survey, just think – what are the simple things? – can they type? – do they have arthritis in their hands? You know, what needs might they have and start adjusting some education before that” (H498-506).

A 26-year old nurse also described the sentiments of the study group when her supportive suggestions for *Future Improvements* converged on assessing competencies and providing “training” as measures to equalize capabilities across nurses on units that utilize EHR. She said:

“I think that [needs assessment] needs to be done when the employees come on. I think that there’s a certain level of computer knowledge you should have to have now in nursing and it’s something that not everyone is used to and, it may be a good idea to have computer training classes beyond the basics for people that maybe have trouble understanding how the system works, just so that they can work easier. Because I think it’s [EHR] a great tool and I think we’re going to eventually be completely paperless like other systems are and everybody just needs to have enough education to be able to comfortably use a computer and not to scare them when we go into computer based forms” (L172-181).

Other dominant descriptions of suggestions that pertain to “training” included focusing the training to make it more nurse-oriented, zeroing in on the basics needed to use the system rather than showing every aspect it, extending the training period to

include times before implementation with review sessions offered, and providing handouts nurses can study before classes and implementation.

Another valued component of EHR training that study participants recommend as vital to success is the hands-on computer simulation referred to as the playground, which could be accessed from any computer within the network. According to participants, the playground facilitated learning as they practiced using the system, especially between training and the actual implementation period.

In addition to the value the study group placed on “training”, they collectively suggested through their narrative descriptions that nurses who are to use EHR in the future be more actively involved in “system development and implementation”. Although there were a few nurses from the various units who participated in early training and became designated as ‘superusers’, overall the study group described a lack of participation in planning among the population of nurses at the target hospitals. The strength of the study group’s consistently described concerns that it would be nice to have input from actual users led to the organization and interpretation of those concerns as the second sub-theme of *Future Improvements*, called “system development and implementation”. This sub-theme captured meanings of instances and descriptions of the study group when they made comments such as, “it would be nice to have input from actual users”.

Most of the participants believed that nurses, as one group of primary users of EHR should have robust representation in “system development and implementation”. The following is an example of a description from the narrative of an OB nurse practicing for 30 years. She said:

“They need a lot of [input from] nurses that work on the floors and not what we call “pencil pushers”[the managers]- the people that have degrees and stuff but haven’t worked on the floors in “x” amount of years. I think they need an everyday nurse [on the team]” (A452-455).

Another nurse with many years of experience working with computers emphasized that, in her opinion, “If you have the staff involvement, then you’re going to know what we

need. If you don't know exactly what we're doing on the floor, how do you know what we need?" (E367-369)

One of the male nurses working in an ICU had a different perspective from the dominant one described by the majority of the study group. He thought that not every aspect of the system needed input from all clinical area nurses. He said:

"I think you just have nursing involved in some capacity - people who really understand what nurses go through on a daily basis so that they can really make decisions with us in mind. There are certain things like the medication administration that I think benefit [from nurse planners' input] and you really have to get these people together. I think it's just situational. If it's a minor thing, I don't see why you need to get everybody involved. But as the scope, as it begins to impact more and more people then I think it would behoove them to have more involvement. I think they've done that fairly consistently" (K462-470).

It became clear during the analysis of the study group's demographics that participants who worked in ICUs at the target hospitals had greater participation rates in "system development and implementation" than did others in the general population of nurses. The specialized types of care provided in ICUs may have contributed enough exceptions or additional needs that had to be programmed into the EHR system to require a greater degree of staff nurse participation EHR planning. Still, other nurses think that all clinical areas are different and that the ways they use the EHR in their units are different; thus, the need for representation and more research.

Some of the descriptions in the narratives that collapsed to create the second sub-theme of "system development and implementation" appeared to contribute to a natural flow of ideas and meanings nurses discussed when the third sub-theme, "approach" emerged from the data. That is, the study group presented dominant views about how best to "approach" the ways EHR is implemented. The study group was in agreement that the "phase-in" approach used to EHR implementation had been effective. According to the participants, using a "phase-in" approach created better acceptance of the change. For participants in the study group, the phase-in made EHR easy to learn because smaller steps were taken rather than overwhelmingly large steps where everything was presented all at once. However, while participants applauded the phase-in approach, many

suggested that the phase-in period be shortened. The following description from an ICU nurse with 13 years of nursing experience captures the group's perspectives about shortening the phase-in. He said:

“I just feel like once they started the ball rolling with moving towards the EHR...they needed to move faster. Because, once you get a taste of how much more...how nice this can be, you just want to hurry and get out there so that you can really benefit for much more time– longer time” (K448-453).

The fourth and last sub-theme of *Future Improvements*, called “equipment” was inducted from the instances of data in which participants suggested that having the right equipment made all the difference to EHR implementation and use. One of the participant's description, cited below, captures the study group's perspective on how important having updated and functional equipment are to the success of EHR. She said:

“Just updating equipment. I think it's [slow & unreliable] computers that create the absolute biggest problem. They want everything [data] in the computer system and then we have to deal with this 20-year old computer on the floor for everybody to access. It just isn't gonna work!” (L324-326, 334-335)

Most of the study participants have suggested that their units need to be provided with faster and more reliable computers to be able to use the EHR optimally and to work efficiently. For them, this valuable tool is an important step forward in improving patient care.

This concludes the presentation of the findings of this study. The discussion, conclusions, and recommendations related to the findings of this study are presented in Chapter V. A summary of this chapter follows.

### **Summary**

This phenomenological study explores and describes the nurses' lived experiences working with EHR. Data analysis according to Martins (1992) method brings to light three major themes consisting of 12 sub-themes. The findings capture the essence of the nurses' subjective interpretations of transitional experiences from former systems to EHR and their views about its effects on nursing practice and patient care. Furthermore, the study findings revealed the factors and processes participants described as essential for

successful implementation and upgrades, which in turn will be helpful for future EHR projects.

## **Chapter V: Discussion, Conclusions and Recommendations**

The purposes of this chapter are to discuss the findings of this study in the context of: (1) extant knowledge about the interactions between electronic health information, nursing practice, and patient outcomes, and (2) the contributions they make to knowledge that supports the introduction of and responses to functional changes in information and data systems that are critical components of professional nursing practice. The stories of the professional nurse participants in this study revealed what it was like for them to first learn about management's decision to implement EHR, prepare for the change, adapt to the change, evaluate EHR's effects on their practices and patient outcomes, and identify important factors they recommend others use in the future when EHR implementation is planned.

Clear examination of the literature in Chapter II indicates that nurses play a key role in the success of major changes in health care organizations. EHR implementation and evaluation are no exceptions. Findings of this study serve to inform health care organizations about insights nurses bring to the EHR change process and illuminate the positive influences nurses can have upon EHR success rates.

Following a brief summary of the study's major findings below, the remainder of this chapter presents discussions of the findings in contexts of what is known, what the study adds, and how the findings can be used in practice. Also included in this Chapter are the investigator's conclusions about the findings, interpretations of the study group's recommendations for future EHR projects, and recommendations for future research.

### **Summary of Major Findings**

In the findings, three major themes and twelve sub-themes emerged from the participants' descriptions of their lived experiences with EHR. The themes represent patterns of common experiences about the EHR that many members of the study group expressed. Overall, the findings reveal that there are *Three Phases of EHR Experiences* that nurses live through when EHR change is introduced and implemented. Those phases emerged from the data and are titled: *getting ready*, *go-live*, and *at present*. In their narratives, study group members described *Dimensions of EHR Influence* that affected

five aspects of nursing practice and patient outcomes. The five dimensions were defined as: *time, efficiency, safety, nature of work, and communication and information access*. Based on their discussions and appraisals of the effects EHR had on selected and defined practice and outcomes dimensions, the study group expressed *Future Improvements* they arrived at as recommendations that will potentially improve future EHR implementation in other hospitals and health care organizations. The *Future Improvements* they recommended were: *training, system development and implementation, approach, and equipment*; all of which they consider important factors for future implementations.

Next, findings are discussed and compared to extant knowledge for purposes of placing the findings in bodies of knowledge capable of further directing the discipline of nursing as a practice profession.

### **Discussion of Findings in Context and Relationship to Extant Literature**

The *getting ready* sub-theme that emerged to describe the first of the *Phases of EHR Experiences*, during which participants expressed anticipation and apprehension, is similar to what Prochaska et al. (1992) described in their transtheoretical model of change as a “preparation stage.” Prochaska et al. identified the “preparation stage” of their model as one of the stages individuals go through during a change process. In both the *getting ready* phase of this study and the “preparation stage” of Prochaska et al.’s model, individuals were found to internalize their decisions to be part of an impending change and prepare to participate in the process. The decisions to participate made by the nurses in this study were based largely on their desires to continue employment at the target hospitals. A decision to not participate in EHR would have forced the nurses in the study group to leave and find jobs elsewhere. Their decisions to stay imposed on each one of them a willingness to gear-up and get ready for the change by actively preparing for what was to come. According to Lorenzi (2004), these behavioral responses of persons facing changes are normal and expected. In this study, the emergence of a preparatory or readiness stage among the sample of nurses facing the change was considered critical to their ownership of the new system and insurance that the change would be successful.

The narratives provide evidence that the majority of nurses in this study felt varying degrees of apprehension during the *getting ready* phase, which they described with terms such as worry, dislike, uncertainty, and intimidation, occurring mostly. Staw (1982) suggested many years ago that feelings such as those mentioned above are typically associated with resistance to change. Many other researchers and theorists have reported similar findings to Staw's and further explain that individuals are likely to resist change when there is uncertainty, concern over personal loss, and a conviction that the change is not in the organization's best interest (Kotter & Schlesinger, 1979; Mariotti, 1996; Strebel, 1996; Reichers, et al., 1997).

In the cases of the nurses in this study, learning that EHR would be implemented replaced the comfort they felt with familiar styles of communication with ambiguity and uncertainty; sources of the apprehension they felt. At risk for the study group was the loss of familiar skills and the mastery they had grown comfortable with during their years of nursing practice. Robbins and Coulter (1999) have explained that the risks associated with losing familiarity and mastery are primary reasons why older employees tend to resist change more than the younger ones. It was apparent in the narratives of this study that older, more experienced nurses had more difficulties with changing to the EHR system than the younger, less experienced nurses. Nemeth (2003) has suggested that the need for nurses to learn new skill sets and behaviors, different from the status quo, causes some degree of fear and insecurity because familiar work styles and patterns are altered. This phenomenon is complicated when older employees with many years invested in the current ways of doing things feel like they have a lot to lose if they change.

Feelings of being intimidated also emerged in the study group. Study participants attributed their feelings of intimidation to being told what to do by upper-level management, not being involved in the decision to make the change, and fear related to lack of training in computer use and the EHR system itself. These feelings and fears associated with intimidation are consistent with what Gremy (1999) reported as findings in a study where staff perceived imposed change as a threat.

Participants in this study group, who were not appointed as special superusers did indeed question whether the imposed change would be in the best interests of the organization, their nursing practice, and their patients. As Robbins and Coulter (1999) suggested, concerns such as the ones posed above are sources of resistance to change. Although it is common knowledge throughout change theories that communication is key to the alleviation of resistance to change, participants' narratives describe managers at all levels failing to discuss the EHR change. Although Robbins and Coulter insist that communication helps with staff buy-in because it helps them see the logic of the change, study group members revealed that this was poorly done.

Communication strategies found in the literature that can address this issue include one-on-one discussions, memos, group meetings, and reports. In any organization, the costs and benefits of time and effort required to carry out these strategies must be weighed against advantages, particularly when the change affects a large number of people across many sectors of the organization. However, evidence continues to support that when employees receive the full facts and have any misunderstandings clarified, resistance to change can be minimized (Kotter & Schlesinger, 1979; Metejka & Julian, 1993; Sagie & Koslowsky, 1994).

One strategy used by the management at the target hospitals that met with reasonable success during the *getting ready* phase was the training of nurses designated as superusers. All of the superusers who participated in this study stated that they felt they helped promote acceptance of EHR among staff. While the superusers did not describe themselves as change agents, they did maximize their efforts to reduce learning curves, uncertainty, and resistance among the staff. Similar findings were reported by FitzHenry and Snyder (1996) and Lee (2006). They found that study participants described nurses who were superusers as instrumental to the organization's adoption of technology. In the aforementioned studies and in this study, superusers were found to encourage end users to cooperate with automation efforts and supported goals for achieving competencies in computer skills at the grassroots level.

The *go-live* sub-theme that emerged to describe the study participants' experiences with implementation *Phases of EHR Experiences* is similar to what Prochaska et al. (1992) described in their transtheoretical model of change as the "action stage". According to Prochaska et al., the action stage is aimed at the desired change wherein the leader applies suitable approaches and facilitates the processes surrounding technological issues involving people and workflow.

In the current study, nurses' common views were clustered into *problems and plusses*. One of the major problems during the *go-live* phase was lack of computer access due to malfunctioning and insufficient computers, mostly during the day shift. Darbyshire (2000) and Littlejohns (2003) reported similar findings in their research studies when nurses expressed concerns about hardware issues and pointed out the importance of computer availability and speed to facilitate work. Other similarities between this study and the aforementioned studies (Darbyshire, 2000; Littlejohns, 2003) were longer work hours and delays in patient care as the nurses were learning the new system. In addition, decreased productivity associated with the learning curve was noted in the findings of this study and a number of other studies (FitzHenry, 1996; Lee, 2006; Popernack, 2006; Scott, et al., 2005).

Other researchers (Larrabee, 2001; Lising, 2005; Nahm, 2000) have pointed out that temporary decreases in staff performance during the first three to six months of a change adoption process are expected and that this investment of time is critical to testing an innovation and adopting new workflow procedures. In contrast, Scott's (2005) study of EHR burden estimated that between 30 and 75 minutes a day could be lost to the change process. Scott also found that EHR burden persisted even after the initial learning period and consequently affected patient care.

The common problem of putting in and transferring doctor's orders that was discussed by some members of the study group persisted in one of the member hospitals and was found to be process-related. Reasons why this problem persisted were not provided in great detail among the study group's narratives. However, there may be some insight in the findings of other studies. For example, Butler and Bender (1999) and

Miranda et al. (2001) reported that redesigning work processes is key when a new system is introduced. It may be the case that one of the target hospitals failed to effectively help the nurses see the differences in work design and function when EHR replaced the paper information system. As Herbst et al. (1999) and Wilson et al. (2000) found, the pressure to change particularly in the early stages of implementation frequently overwhelms the staff when they do not recognize the advantages or benefits of the new or future processes.

The positive experiences revealed by the study group during the *go-live* phase of *Phases of EHR Experiences* were described as *plusses* and were attributed to teamwork, training, clinical application support, superusers, and supplemental staffing. For this study's participants, these were critical factors for a smooth transition to the new system. With the challenge of learning a new system, nurses were able to share with colleagues in their unit knowledge of basic computer use gained through their own initiatives, formal EHR training, and the training "playground." Clinical application support personnel, also called "*the red shirts*" were available in the nursing units on all shifts during the early stages of implementation to assist with any EHR system-related concerns. In addition to "*the red shirts*," unit-based superusers played key roles because the additional training they received made them "home-grown" resources that coworkers readily approached. One superuser explained how he supported colleagues at the grassroots level. He remarked, "They'll (the red shirts) come on over to help the staff, but I'll be the liaison to help explain, I mean some of the computer guys are really pretty good, but they don't know how to talk 'nurse talk.' And the nurses don't know how to talk 'computer talk'" (H171-174). Additionally, work schedules of superusers were arranged by nurse managers in such a way that at least one superuser was assigned to work every shift, which bridged communications between staff, support personnel, and clinical colleagues. This arrangement was also determined to be an effective strategy that maximized the role of superusers and smoothed out the technology adoption process (Lee, 2006).

Interpreted in the context of management theory, superusers are comparable to "champions of change" or "idea champions". Idea champions actively and

enthusiastically support a new idea, build support, overcome resistance, and ensure that the innovation is implemented (Robbins & Coulter, 1999). Common personality characteristics of superusers or champions include extremely high self-confidence, persistence, energy, and a tendency toward risk-taking. According to Robbins and Coulter (1999), champions also exhibit attributes associated with dynamic leadership. They inspire and energize others with their vision of the potential of an innovation and through their strong personal conviction in their mission. In addition, they are good at gaining the commitment of others to support their mission. Based on the narratives of the superusers in the study group, it is apparent that they possessed the qualities of “idea champions,” which were crucial in helping staff cope with the change adoption.

A plus that was mentioned by participants in the current study was that of paying closer attention to doctors’ orders and the delivery of medications to patients with the new information system. As reported by Scott et al. (2005), some nurses claimed to have been more cautious in administering medications and prioritizing their plan of care during EHR implementation. This too was found in the *go-live* phase of the current study. This phenomenon suggests that there was an increased sense of accountability in performing duties and making clinical decisions among nurse participants, which in turn benefited the patients they served.

In the third phase of *Phases of EHR Experiences*, the sub-theme *at present* emerged from participants’ descriptions of times when they thought they were “getting better” at working with the EHR system. Most expressed that in this time they felt they were past the learning curve and had attained a higher level of confidence with the use of the system. One of the nurses explicated her mastery of EHR use when she said:

“I feel pretty confident using it. I don’t really have trouble and there’s not anything I can think of in there that I really don’t know how to do that I need to do on a daily basis. So I feel pretty comfortable even inputting verbal orders and things like that. I don’t really have any trouble with it. It’s pretty easy to use.” (L316-320).

Having a higher level of confidence and mastery of the EHR system was evident in the manner in which members of the study group integrated the use of the EHR into their nursing practice and talked about their comfort with it as “second nature.”

Contrasting experiences in terms of management support also emerged from the data within the same descriptions study participants offered during discussions of their EHR experiences *at present*. While many expressed admiration towards their managers’ actions such as providing support for the conversion in terms of extra staff, superusers, and training, some verbalized their disappointment for lack thereof. Some participants claimed that managers did not include the staff in making EHR-related decisions that directly affected them. The disappointment could have been avoided if the managers used participation strategies to include staff in decision-making and thereby reduce resistance to change at the same time (Robbins & Coulter, 1999). According to Robbins and Coulter, it is difficult for individuals to resist a change decision in which they participated. Before a change is made, those who are opposed can be brought into the decision process. Assuming that the participants have the expertise to make meaningful contributions, their involvement can reduce resistance, obtain commitment to seeing the change succeed, and increase the quality of change decision.

Sub-themes four through eight, namely *time, efficiency, safety, nature of work,* and *communication and information access* are interrelated and were clustered in Theme Two and illustrated in Figure 5.1, *Dimensions of EHR Influence* on nursing practice and patient outcomes.

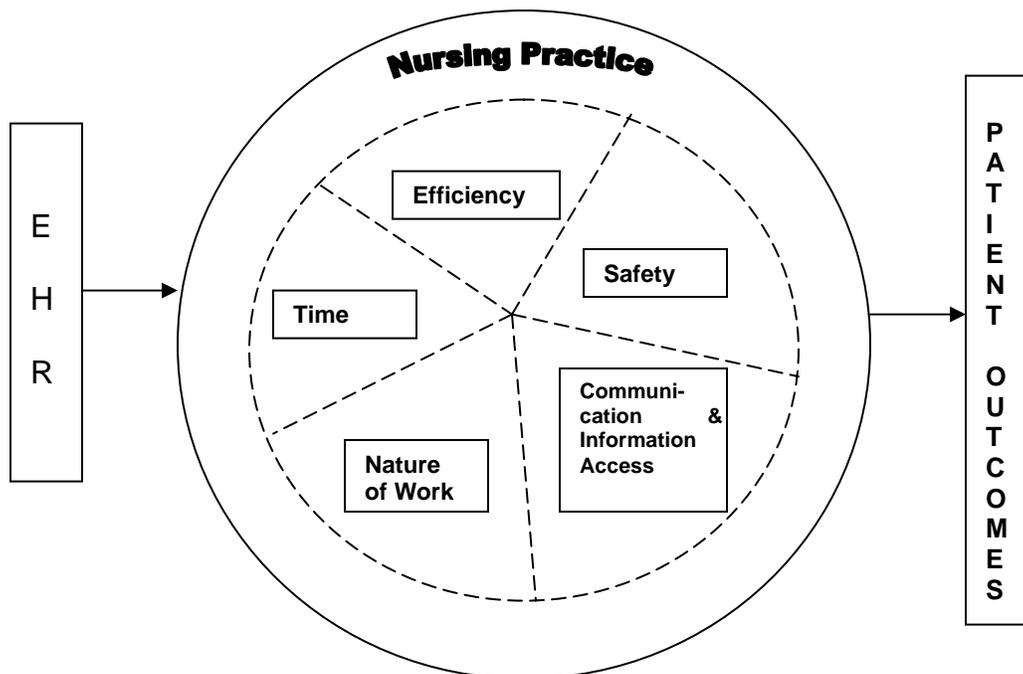


Figure 5.1 Dimensions of EHR Influence

When EHR was implemented, several dimensions of influence drawn from the narratives of the participants emerged during their discussions of how they believed EHR would affect nursing practice and patient outcomes. As shown in Figure 5.1, the Dimensions of EHR Influence are seen in the inner wheel, which is divided into five parts (dimensions). A dashed line between each dimension indicates that they are interrelated and not mutually exclusive. However, for the purpose of discussion, each dimension will be presented separately.

Maintaining paper-based records is a big challenge, as the staff must deal with lost charts, tracking missing charts, and duplicate records. Very frequently, skilled providers spend a huge amount of time finishing paperwork instead of treating and caring for patients. With the conversion to a paper-free EHR, many participants in this study said they had more *time* to spend with patients because documentation in EHR takes less time than in a paper-based system. This finding is consistent with studies conducted previously. In a four-year Australian study (Fraenkel, et al., 2003), critical care nurses perceived the EHR as an effective time management tool that decreased documentation time and allowed them more time to provide direct patient care. Productivity and

effectiveness also increased with automated nursing documentation in the Krampf and Robinson study (1984). In addition, McHugh (1992) and Weiner et al. (1999) reported that increased quality of patient care was attributed to computerization of the health record and documentation practices.

Many participants in this study stated that EHR had increased *efficiency* in their delivery of nursing care. Efficiency in work processes such as time spent on medication checking and delivery, entering orders, receiving orders, and admission and discharge has come about because of EHR. In a white paper by the Healthcare Information and Management Systems Society (HIMSS) (2006), concrete instances of process improvements after EHR implementation were cited. For example, in a Cincinnati children's hospital, there was a 52% decrease in time spent on the medication cycle and entering and receiving orders. In another Cincinnati hospital, a reduction in call-backs to physicians and nurses' calls to patients reduced turnaround time for medication delivery and instructions. Administration times improved 18% to 88% across a study group of participating hospitals in the Cincinnati study.

The health care industry continues to see improving patient safety as a major imperative, especially since the Institute of Medicine (IOM) study (1999) revealed that as many as 98,000 Americans die each year as a result of missed diagnoses, fatal drug interactions, and inappropriate treatments by physicians and nurses. Nurses in this study verbalized that they notice an improvement in patient *safety* since EHR implementation, partly because problems associated with illegible doctors' orders have been eliminated. Simple things such as replacing the bad handwriting of harried physicians have moved the industry toward more accurate treatment of patients and a reduction in the amount of time staff and pharmacists used to devote to dealing with drug interactions or prescribing issues. The EHR system has an embedded decision support feature that alerts physicians, nurses, and other staff to the potential for prescription problems while helping them automatically calculate dosages based on patient characteristics. For example, in a large medical center in New York, problem medication orders dropped by 58% and medication discrepancies by 55% in 2001 after EHR implementation. In that same year, the decision

support feature identified 164,250 alerts, resulting in 82,125 prescription changes that averted errors and risks to patients. Additionally, reports from a five-hospital system in Ohio indicated that EHR warnings and alerts improve care because they cue health care providers to orders that require co-signatures, to abnormally high or low laboratory results, and to changes in patient's location within the institution or at discharge.

The congruence between the study group's *nature of work* before and after the system conversion to EHR contributed to their positive views towards EHR. Not only did the new system maintain the existing workflows that the nurses were comfortable with, it also enhanced work processes such as admissions, transfers, and discharges. This was also found to be true during an EHR study in Norway (Laerum, et al., 2001) where reinforcing and maintaining existing work patterns were found effective. Additionally, adjusting the EHR according to the staff shift schedule as they requested made it more convenient for them to get their jobs done.

The fifth *Dimension of EHR Influence* was found in the narratives as an enhancement of *communication and information access* among health care providers. According to the study group, something as basic as legible documentation rather than physician scrawl helped them prepare and administer the right medications at the right dosages to the right patients and enabled to better understand each patient's plan of care. For them, the broadcast style communication of communication (e.g. in disseminating orders and consults to other departments) that is inherent in EHR systems is essential to efficiency and safety, especially in a large health care services environment. Access to real time patient information through EHR was also cited as invaluable. Physicians working in the target hospitals included in this study are able to input orders and access patient laboratory results from any computer within the campus, at their homes, and from any computer that could connect to the network. Study group participants who worked in telemetry units stated that laboratory results were readily available and all members of the team could use the EHR to make accurate adjustments in a patient's medication dosage or drip rates of intravenous solutions in a timely fashion. With EHR, participants

admitted that all dimensions of influence were interrelated and positively worked together to improve patient outcomes and most work processes.

The white paper released by the Healthcare Information and Management Systems Society (HIMSS) (2006) documented several actual instances of increased communication and information access after EHR implementation in hospitals in major U.S. cities. For example, in a large New York medical center, laboratory and radiology results were distributed electronically within 12 to 48 hours to a nursing pool where results were screened. Abnormal records were sent automatically to the physician of record. Traditionally, without EHR, this process takes a week and the chances that abnormal results would be missed would be much higher. In another New York health agency, EHR allowed for sharing of documentation by all staff. The nursing staff's documentation of vital signs, immunizations, and finger stick glucose testing were readily available online at all times across the continuum of care. This process helped eliminate duplication of effort, and more importantly, encouraged users to read what other caregivers had documented.

An Ohio pediatric care facility uses a blue font color to inform nurses of a new order for a patient. The font color changes to black when the order is completed. Electronic order entry involving respiratory orders can be combined with pager notification in EHR to alert, for example, the radiology department of the need for its services. In a Missouri health care system, physicians now have the option of entering orders at hospitals or long term care facilities, or even remotely, and many choose to do so. Orders are compared in real time with rules and standards designed to reduce errors and improve quality of care including medication interactions, allergy checking, presentation of pertinent results, and order confirmation.

The last theme that emerged from the narratives in this study is called, *Future Improvements*. It symbolizes the meanings the study group members gave to their desires to make EHR implementations less complex and more successful in the future. The four sub-themes that emerged to organize the *Future Improvements* the study group recommended encompass *training, system development and implementation, approach,*

and *equipment*. The study group proposed that in preparation for EHR *training*, a needs assessment should be conducted to ascertain the individual computer skills level of each staff member. Then, customized computer training to build general skills should be provided in the *training* so that navigation of the database is facilitated. Similarly, *training* was found to be important when Alpay and Russell (2002) analyzed surveys of the 225 nurses who were enrolled in their study. Those nurses expressed a desire for formal training in basic computer skills to replace the minimal basic training that was offered to them by their employers during the change to EHR. Many in their study sought help from children at home or sought help from colleagues at work because they had no previous general computer training. The nurses in this study discussed similar requests and activities. Computer training has been found to increase nurses' computer competence and skills to adapt to the new system. It also enables them to grasp how the technology benefits their practice in the overall health care setting (Alpay & Russell, 2002).

Instances of data that created the sub-theme, *system development and implementation*, communicated the study group's recommendation that input from those who are expected to actually use EHR in their daily practices is absolutely necessary. Extant literature suggests that for a particular computer system to be optimally used, there is a need for it to work within a context (Bardram, 2000; Shortliffe, 1987; Simms & Ngin, 2000). This inclusion strategy requires consultation and research involving all potential users to provide insights into their day-to-day practices. Failure to adequately consider the end user and his or her needs can defeat the project. In addition, an end users' needs analysis can effectively predict user satisfaction, which in turn predicts the success of a project. Consultation and research can take many forms, including exploring views and experiences (Blackman, et al., 1999; Weiner, et al., 1999), eliciting subjective norms and beliefs (Hebert & Benbasat, 1994), and examining the wider organizational and social contexts within which a change is planned (Currie & Brown, 1997; Keen, et al., 1991). For example, the Denmark Collaborative Informatics in Clinical Practice project was launched to redesign a national hospital information computer system

(Bardram, 2000). The project had two approaches. The first involved ethnographic observations and qualitative interviews with key staff in the hospital. The second employed a participatory design process to facilitate development of new software. The two methods helped to bridge the gap between information technology ideas and the health care practice milieu.

The third sub-theme of *Future Improvements* emerged as ***approach*** and was based on a majority of the study group's suggestions that phasing-in the implementation of a project like EHR would be more highly effective than any kind of big-bang approach. Hanlon and Shaheen (1999) were also in support of what they called a "phased roll-out" rather than a big-bang or shotgun approach, particularly in large multi-facility, multi-specialty enterprises. Unlike the phased-in style, the big bang rollout is a more aggressive approach that turns on all integrated system modules at one time, replacing the one previously used with a single system in one comprehensive *go-live*. On the one hand, the big-bang method involves a short-term build up of human resources with no need for temporary workflows and little opportunity for second-guessing. On the other hand, the big-bang approach can overwhelm end users with too much change at one time, thereby decreasing their acceptance of the new system.

Unlike the big bang method, the phased-in *approach* involves turning on parts of the functionality at successive *go-lives* rather than all at once. It can also mean a phasing-in of end users by department, clinic or unit. The total *go-live* process can extend for months to years. According to Karnas and Robles (2007), what makes the phased-in approach attractive to many organizations is its manageability. The resources required can be spread out over a longer period of time. The training is less intensive, more focused, and can generally be accomplished in much shorter classes. Using a phased-in approach, the end users are better able to absorb the knowledge without getting anxious. Additionally, problem identification and problem resolution are handled on a smaller scale and resolutions and lessons learned are applied to the subsequent implementation phases. Using a phased-in approach, the EHR rollout is more likely to be received

positively by the rest of the enterprise if there is good press by the pilot rollout sites (Souther, 2001).

The participants in this study group also indicated that updating *equipment* to faster and more reliable units is essential for successful EHR change. A similar finding to this sub-theme referring to *equipment* in *Future Improvements* was reported in another qualitative study by Darbyshire (2000). The speed of the computers with regard to how quickly and easily screens and data appeared was seen as extremely important by study participants. Nurses that have faster computers at home felt frustrated with sluggish computers in the workplace. Faster and more reliable tools tend to be used optimally and are crucial in helping clinicians become more responsive in their roles.

### **Conclusions**

This investigation was able to identify the phases that nurses go through as they work with the EHR in the clinical setting, describe the influences EHR has on nursing practice, and capture suggestions participants discussed for future implementations and upgrades. Three different time periods were associated with this change. The *getting ready* phase was how they prepared for the transition (e.g. training, etc.). *Go-live* was the period of time when the implementation was initiated, while *at present* pertained to current perceptions of the system and how it influences nursing practice. The *getting ready* and *go-live* phases were similar to two stages of Prochaska et al.'s (1992) transtheoretical model of change, namely the preparation stage and the action stage.

Five levels of *Dimensions of EHR Influence* towards nursing practice and patient outcomes were identified in the narratives. These changes in nursing practice were determined to be similar to those reported in earlier studies. With the EHR in place, the participants reported shortened documentation time that has led to increased patient care time, efficiency in work processes, improvement in patient safety, enhanced communication between health care staff and increased information access. The participants believed that these transformations positively affected patient outcomes and the overall safety and quality of patient care.

Lastly, the participants determined that for *Future Improvements*, the areas of training, system development and implementation, approach, and equipment should be considered to increase nurses' acceptance and increase implementation success rates. While many of the findings are not unique to this study group, they do add richness, specification, and clarity to extant knowledge so it can be translated and used in practice. New knowledge added by the findings of this study include the recommendations that the study group made for future EHR successes and idiosyncratic applications of change theory to populations of health care providers who must be included in decisions about EHR implementation.

### **Recommendations**

Although further studies that explore nurses' experiences working with EHR need to be done, the findings of this study make important contributions to improving our profession's preparation of EHR implementation so that we are more quickly able and positively adapt to this innovation. The recommendations for such preparation described in this section come mostly from the study group with support from the literature.

While an increasing number of nursing schools are incorporating nursing informatics into their programs to raise computer competencies in their graduates, nurses who do not have a lot of computer experience may benefit from a needs assessment based on the computer skills required for the specific EHR used in the organization where they are employed. It may be offered as a component of new employee orientation when they join the health care institution or as part of a pre-EHR training when they are already employed, prior to the system implementation. In addition, appropriate basic computer training can be given to shorten the learning curve and make the transition to the new system smoother.

The study group suggested that EHR implementers provide nurse-oriented hands-on computer training with simulation and practice opportunities. This strategy will zero in on what nurses need to know in order to familiarize and equip themselves with skills to competently navigate the system. A phase-in implementation approach was recommended in order to gradually introduce the new system and not overwhelm the

staff or compromise patient care. In addition, superusers were found to be critical to staff buy-in and to increasing the level of acceptance by end-users. Superusers are the liaison between their clinical colleagues and the application support personnel.

The participants also suggested maintenance or enhancement of current workflows and not a total work redesign when EHR is being planned. In high turnover units, such as labor and delivery, appropriate consideration through process or system adjustments with management and staff consultation should be performed accordingly. Clinical application support and technical support should be provided so the needs of the clinicians are met.

It is critical that key individuals in decision-making roles with regard to EHR development, design, and implementation have in-depth knowledge about the change process in order to comprehend the responses of nurses toward the new system. The change is not entirely about technology because successful implementation also transforms the ways nurses work and how they deliver their services. In this study, the changes in nursing practice, as influenced by the EHR, have brought only soft returns on investments (ROIs), such as timely, more efficient, and safer patient care. Other returns include an enhanced workflow, more direct communication with other health care personnel, and increased information access; all of which are considered essential to improving patient outcomes. Therefore, it is important for leaders to be cognizant of these soft ROIs and keep nurses involved when making decisions that affect nursing practice in the organization. In addition, these soft ROIs, in turn, will affect hard ROIs (e.g. productivity, patient flow, allocation of resources, etc.). At the infrastructure level, investments on more reliable and responsive equipment that support and facilitate nurses' work will help improve the competitive standing of the organization.

The findings in this study will increase awareness among nurses, especially those whose health care agencies have not yet implemented EHR. In addition, the outcomes provide an impetus for a broader determination of how EHR transforms nursing practice and affects patient outcomes. As this study is not exhaustive, more research is suggested to expand these findings to other areas of practice and the outpatient setting. An

investment in reviews and empirical research is necessary to provide a solid base to help improve nurses' adoption of EHR in their work, increase implementation success rates, and positively impact the quality of health care provided by nurses.

### **Summary**

Findings from this study and those reported in the literature indicate that EHR positively influences nursing practice especially in the areas of time, efficiency, safety, nature of work, communication and information access. As one of the major users of the EHR, nurses' input into system design, development, and implementation is essential and should be considered a priority by decision-makers, administrators, and managers of this change. In addition, nurses' needs and preferences need to be taken to account in the context of their areas of practice. This will foster acceptance and optimal use of the EHR, which can contribute greatly to the success of the project and improvement in patient outcomes and quality of care.

Appendix A  
Biodemographic Data Form

Code \_\_\_\_\_

### Biodemographic Data

Age: \_\_\_\_\_

Gender: Male \_\_\_\_\_ Female \_\_\_\_\_

Highest Level of Nursing Education: \_\_\_\_\_

Years of Staff Nursing Experience: \_\_\_\_\_

Years of Other Nursing Experience: \_\_\_\_\_ (please specify) \_\_\_\_\_

Self-Rating of Computer Competency: \_\_expert \_\_ novice \_\_somewhere in between

Time typically spent at home using a computer \_\_\_\_\_ hours per week

Most frequent type of home computer use (self): \_\_ e-mail \_\_ pay bills \_\_ play games  
\_\_surf the Internet \_\_purchase merchandise \_\_other (please specify)

\_\_\_\_\_  
Years of experience using computers in the workplace: \_\_\_\_\_ (please specify type of use)

\_\_\_\_\_  
Current Nursing Unit Specialty Designation: \_\_\_\_\_

Duration of your EHR use (in months) at this hospital: \_\_\_\_\_

Duration of your previous EHR experience (other than Epic, if any): \_\_\_\_\_ (in months)

What module (e.g. medication, laboratory, nursing documentation, etc.) of the EHR do you have most experience with? Please specify \_\_\_\_\_

Appendix B  
Semi-structured Interview Guide

## Semi-structured Interview Guide

1. Tell me in your words how you describe what an Electronic Health Record is?
2. Tell me about the ways in which EHR influences your work with your patients.

Probe for:

- Thoughts about quality of care, time spent doing care, time spent doing documentation
  - Comparisons made about use of former vs. EHR system. For example: in terms of efficiency and accuracy in documenting the following: medication administration record (MAR), vital signs, etc.
  - Views about benefits and drawbacks to any documentation system used
  - Communication issues related to documentation, collaboration, decision-making
  - Nursing-specific evaluations of EHR
  - Is the system congruent with the workflows in your unit?
3. Now think back, and tell me about your initial reaction to the news that EHR would be implemented on your unit.

Probe for:

- Early thoughts about making this change
  - Personal opinions about the value of this type of system
  - Images of how work with patients and workload would change
  - Anticipated actions the individual wanted to take regarding this impending change
4. Tell me how you prepared to make the change to EHR.

Probe for:

- Self or employer assessed the needs in terms of computer attitude, computer experience and skills
- Mandatory or voluntary participation in computer training and system information before new system was implemented
- Types of training offered and opinions of their value. For example: classroom/didactic form, computer modules, hands-on training, etc.
- Amounts of time involved in practice/simulation, etc.
- Anything that was missing from what took place, both from the perspective of what the individual did or could have done and from the individual's perspective of what the employer may or may not have provided

5. Tell me about what it was like on your unit the day EHR was implemented for daily use.

Probe for:

- The actual challenges experienced. For example: any flaws in the system, any problems with under-preparation of staff, effects on patient care and work hours (prolonged?), documentation time (increased or decreased), patient safety, accuracy in documentation, and ease of data retrieval
- How individuals and management coped with challenges?
- Availability of technical support staff (Information System personnel, clinical implementation specialists and superusers)
- Evaluation of support from management

6. Now that you have worked with EHR for a time, tell me how you really feel about using it.

Probe for:

- Real-time effects on patient care outcomes– time spent with patients, quality of care
- Advantages and disadvantages of EHR?
- Effects on workflow and time management
- Level of confidence in the use of the system and any views about needs for “retraining” and continuing education
- Changes needed in the system

7. Looking back at the overall change process involved with EHR, tell me what you would advise others to do to when planning and implementing this change.

Probe for:

- Assessment of and recommendations for staff involvement in design, development, and implementation of the new system
- Involving staff in all processes to promote “buy-in” (acceptance and willingness to use the new system)
- Suggestions for particular implementation strategies and their success potentials (e.g. big bang method-simultaneous, involving all departments; phased-in method – per unit or department). Was it effective?
- Nursing representation on the change teams

8. What else would you like me to know about your experiences with EHR?

Appendix C  
Recruitment Flyer

# *Interested in a study of EHR and Nurse's Work?*



## *Contact the investigator to learn more*

This interview study is a dissertation that explores nurses' experiences with EHR.

Qualifications include:

- RN practicing in an inpatient area
- Minimum of 4 months EHR/EMR use

### **For more information, please contact:**

Anne S. Liong at (281) 513 5794 or email [maliong@utmb.edu](mailto:maliong@utmb.edu)

### **Principal Investigator:**

Anne S. Liong, RN, MN, MBA  
UTMB Graduate School of Biomedical Sciences  
Nursing Doctoral Program  
Candidate for the Ph.D. degree

All information about participants will be confidential and findings will be presented in aggregate form to guide future research. The Institutional Review Board at UTMB has approved this study. Their guidelines for the protection of human subjects will be followed at all times.

Appendix D  
IRB-Approved Subject Consent Form

## SUBJECT CONSENT FORM

You are being asked to participate as a subject in the research project entitled, “Descriptions of Nurses’ Experiences with Electronic Health Records (EHR): A Phenomenological Study,” being conducted by Marie Anne S. Liong, RN, MN, MBA. Ms. Liong is a student in the UTMB Graduate School of Biomedical Sciences Doctoral Nursing Program. This project is supervised by Dr. Judith C. Drew, RN, PhD, Professor at the School of Nursing and a full member of the GSBS faculty. There is no sponsor for this study. Ms. Liong is not receiving funding in any form from any source to conduct this dissertation research. It is a requirement she must meet to complete the Ph.D. degree.

### *PURPOSE OF THE STUDY*

The purpose of this study is to learn more from nurses about how EHR affects daily work with patients and what could be done to make change processes better before, during and after implementation of EHR. The study fulfills the dissertation research requirement that Ms. Liong must meet as a candidate for the Ph.D. degree. You are being asked to participate because you are a registered nurse who has experience with using EHR to document the care that is provided to patients you serve.

### *PROCEDURES*

Ms. Liong will ask you to discuss your experiences with using EHR and what you suggest others do when preparing to implement and transitioning to use such a system. Your opinions and experiences are valuable to future changes that may be made to improve EHR and similar systems. This is an interview study. There are no procedures or interventions. Each interview will take no more than 90 minutes of your time, and will be conducted in a place that you choose for convenience and privacy. Depending on how long it takes to complete all the interview questions that Ms. Liong has, you may be asked to meet with the investigator a second time. All interviews will be audiotaped for later transcription and analysis of themes that may be common to what many participants suggest throughout the interviews. The investigator will also ask you to complete a short questionnaire seeking information about your age, gender, level of nursing education, length of nursing and computer experience, duration of EHR use, and previous EHR experience. Aggregate findings from the research will be shared with colleagues so that future research can be planned and the implementation of EHRs can be improved. Your individual remarks will be integrated with remarks from the entire group so that no one person’s words can be identified. All study materials will be destroyed one year following the completion of this study. Codes will be assigned to each participant and names will never appear on tapes or transcripts.

## *RISKS OF PARTICIPATION*

The potential risks from participation in this study are few. You may become fatigued during the interview. There are no procedures or treatments associated with this research project; only conversation during the interview. Another potential risk from participation in the study is loss of confidentiality. However, the investigator will take all possible steps to assure your confidentiality by coding code study materials to reduce this risk and keep study materials in a locked file. Nevertheless, there remains a minimal risk of loss of confidentiality.

## NUMBER OF SUBJECTS PARTICIPATING AND THE DURATION OF YOUR PARTICIPATION

The anticipated number of subjects involved in the study will be 15. All will be nurses with EHR experiences. The length of each interview session will be limited to no more than 90 minutes. The number of interview sessions will be determined by how much time is needed to answer all the interview questions, therefore you will participate in at least one interview session but no more than two. The study will begin in September 2007 and will be completed by September 2008. Your commitment of time will be only the interview sessions you agree to schedule and complete with Ms. Liong. Your second and last interview, if needed, will be completed within two months time from when you complete your first interview with Ms. Liong. While this study will go on for approximately one year, your participation as an individual will last over approximately two months.

## BENEFITS TO THE SUBJECT

There are no direct benefits to you for your participation in this study. However, you may gain insight into your EHR experiences and use those to make changes in your daily work and the work of others.

## OTHER CHOICES (ALTERNATIVE TREATMENT)

There are no treatments in this study. You will meet with the investigator only to discuss the interview questions and answers you wish to provide. The alternative to participating in this study is to choose not to participate. Participation in this study is voluntary and not required.

## REIMBURSEMENT FOR EXPENSES

There is no direct reimbursement for your participation in this study. However, in appreciation for any inconvenience your participation presents to you, a \$25.00 gift card

will be mailed or delivered to you approximately two weeks after you have completed all interview sessions scheduled with Ms. Liong.

#### COMPENSATION FOR RESEARCH RELATED INJURY

There are no treatments or substances given to you as part of this study's procedures. This is a study that only involves being interviewed by the researcher. The likelihood of you sustaining any type of physical injury because of your participation is extremely rare. However, if you are physically injured in any way because of your participation in this study, UTMB will provide you with the appropriate medical treatment not covered by your own insurance or health care program at no cost to you to the fullest extent permitted by Texas law. You will be responsible for paying any costs related to illnesses and medical events not associated with being in this study. No other forms of compensation are available. However, you are not waiving any of your legal rights by participating in this study.

#### COSTS OF PARTICIPATION

There will be no cost to you for your participation in this study.

#### REASONS FOR THE STUDY INVESTIGATOR TO STOP YOUR PARTICIPATION

You may be dropped from the study by the study investigator if the study is discontinued. If this is the case, Ms. Liong will contact you and explain the situation.

#### PROCEDURES FOR WITHDRAWAL

If at any time you wish to stop your participation in this study, simply contact the investigator at the numbers provided at the end of this consent form. Upon learning of your request, your participation will be ended.

#### USE AND DISCLOSURE OF YOUR HEALTH INFORMATION

Even though in this interview study no health information is accessed, collected, or used, you must know that all study records that identify you will be kept confidential as required by law. Federal privacy regulations provided under the Health Insurance Portability and Accountability Act (HIPPA) provide safeguards for privacy, security, and authorized access to your records. These regulations require UTMB to obtain authorization from you if it or anyone employed there attempts to use and disclose your health information. By signing this consent form, you are agreeing to participate in this study. You are not authorizing the use and disclosure of your health information related to this research study.

Except when required by law, you will not be identified by name, social security number, address, telephone number, or any other direct personal identifier in this study's records. However, you do need to know that study records will be coded without your name and be kept confidential as required by law. You will not be identified by name in study records. A code number will be assigned to you and only Ms. Liong will know that number. The key to the code will be kept in a locked file in Ms. Liong's office.

There are no sponsors for this research. Ms. Liong is acting alone, but under the supervision of her faculty, Dr. Drew, to complete her requirements for a doctoral degree. The study data, meaning the contents of your interview(s), will not be linked to you as an individual. Instead, the data you provide will be put together with data from all other participants and reported that way. You may see or receive a copy of any research reports of findings from this study at its conclusion. Please request those from Ms. Liong. If you sign this form, you are giving Ms. Liong permission to collect, use, and share the information you provide during the interviews. Your health information is not part of this study and you will not be asked about it nor will it be accessed. You do not need to sign this form. If you decide not to sign this form, you cannot be in the research study. Whether or not you agree to participate in the research project or give us permission to collect, use or share your interview information will not affect the care you will be given at UTMB.

Your interview information, without your name on it, may be reviewed by Dr. Judith Drew, for purposes of assisting Ms. Liong with learning to understand the data analysis process. If for any reason you want to stop your participation in this study, you can at any time. However, you need to inform Ms. Liong at the contact numbers listed in this consent form. You need to say that you have changed your mind and do not wish to continue participating in this study. At that time and thereafter, Ms. Liong may not collect any additional interview information from you. However, she may use the information that she has already collected. It is important to learn everyone's experiences, not just those of persons who complete the research study. The results of this study may be published in scientific journals and presented as posters without identifying you by name.

#### ADDITIONAL INFORMATION

1. An offer has been made to answer any questions that you may have about these procedures. If you have any questions before, during or after the study, or if you need to report a research related injury, you should immediately contact Ms. Liong at (281) 513 5794 or (281) 534 1696 or, Dr. Judith Drew at (409) 772 8227.
2. Your participation in this study is completely voluntary and you have been told that you may refuse to participate or stop your participation in this project at any time without penalty or loss of benefits and without jeopardizing your medical care at UTMB. If you decide to stop your participation in this project and revoke your

authorization for the use and disclosure of your health information, UTMB may continue to use and disclose your health information in some instances. This would include any health information that was used or disclosed prior to your decision to stop participation and needed in order to maintain the integrity of the research study. If we get any information that might change your mind about participating, we will give you the information and allow you to reconsider whether or not to continue.

3. If you have any questions regarding your rights as a subject participating in this study, you may contact Dr. Wayne R. Patterson, Senior Assistant Vice President for Research, Institutional Review Board, at (409) 266-9475.

The purpose of this study, procedures to be followed, risks and benefits have been explained to you. You have been allowed to ask questions and your questions have been answered to your satisfaction. You have been told who to contact if you have additional questions. You have read this consent form and voluntarily agree to participate as a subject in this study. You are free to withdraw your consent, including your authorization for the use and disclosure of your health information, at any time. You may withdraw your consent by notifying Ms. Liong at (281) 513 5794 or (281) 534 1696 or, Dr. Judith Drew at (409) 772 8227. You will be given a copy of the consent form you have signed.

Date

Signature of Subject

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Signature of Witness

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Signature of Authorized Representative (*if applicable*)

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Description of Representative's Authority to Act for Subject (*if applicable*)

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Using language that is understandable and appropriate, I have discussed this project and the items listed above with the subject and/or his/her authorized representatives.

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Date

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Signature of Person Obtaining Consent

Appendix E  
Sample Codebooks 2 & 3  
Theme 2

**Sample Codebook 2 (Theme 2)**

<b>Sub-themes</b>	<b>Descriptions</b>	<b>Instances of Data</b>
Time	<ul style="list-style-type: none"> <li data-bbox="444 457 867 489">❑ Gives me less time (initially)</li>   <li data-bbox="444 747 854 816">❑ Takes an extra bit of time to catch up</li>   <li data-bbox="444 1150 854 1182">❑ Eventually, it will save time</li>   <li data-bbox="444 1262 846 1331">❑ You have to wait until the physician puts the orders in</li>   <li data-bbox="444 1482 878 1551">❑ The patient has left the room (O.R.) and we're still charting</li> </ul>	<p data-bbox="941 457 1166 489">It's a delay. (A8)</p> <p data-bbox="941 495 1432 741">Uh not really takes away the quality, it gives me just less time, I mean I get everything done that I need to get done and everything, it's just I might a few more minutes to relax, my mind to relax if I didn't have to mess with it. (A12-15)</p> <p data-bbox="941 747 1432 1146">Um, the problem that I have with that as far as that is because everybody's finding it hard to be able to learn to do it and when you follow somebody you're following their mistakes and then so that takes you extra bit of time to have to catch up. If everybody knew how to do everything the right way, and wasn't doing It their own personal way, then it would probably be a lot lot better. (A51-57)</p> <p data-bbox="941 1152 1403 1222">I think when it gets down, it will be good it will save time.</p> <p data-bbox="941 1228 1432 1257">Eventually it will save time. (A69-71)</p> <p data-bbox="941 1264 1414 1476">Advantages is there and disadvantages is it's taking a lot for the physician to get to that patient to put in the orders of course you have to wait until that gets put in. (B265-267)</p> <p data-bbox="941 1482 1432 1875">A lot, well it was a lot of stuff to remember all at one time. You only get it once and it was you know probably a few weeks before you actually started using the system, so it's not like you can remember that much information a few weeks ago to being right there when you have a patient, so it was a rough change. You're busy and you have a patient and it's not like you have a lot of</p>

	<ul style="list-style-type: none"> <li>□ Saves you more work later on and makes your charting more complete</li>   <li>□ More time for patient</li>   <li>□ It gives me a little bit more time spending time with my patient and taking care of them</li> </ul>	<p>time to sit down and chart in some of those cases especially the real fast ones, so we, by the time that first few weeks, the patient's already left the room and we're still charting. A lot of cases are real fast, they last 20 minutes and you're not used to the system it has like more than a dozen drop down menus for you to finish. I'd say it was a rough change. (C129-139)</p> <p>I like it actually. I like it a lot. When we had paper charting and you forget enter something they would send you a copy of the paper chart and you had to go all the way up to medical records to do an addendum of your chart and now it's not that bad because it actually won't close for you if you don't fill out those, it has those stop signs. You have to fill them out before you can close the chart, before you verify the chart. It won't verify, once you hit the verify button it will give you a list of things you did not fill out like ADL's and all that. They mark all the stuff that you have to fill out before you can close up the chart. So, in that way it saves you more work later on and it makes your charting more complete. (C175-185)</p> <p>You have more time for the patient because the documentation is just read through and click and move on, so it's quicker, make more time for the patient. (D13-15)</p> <p>Most of the time I don't think that it decreases our documentation time so much yet. We do chart by exception, but it does help as far as when the medication records come up because before we used to have to write out when you get a new admission, write</p>
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	<ul style="list-style-type: none"> <li>❑ You can go back and look – everything’s there. But in a fast pace area, it’s time consuming</li> <li>❑ It gives us a little bit more time...it is saving time</li> <li>❑ It gives us more time to care for the patient</li> <li>❑ It does give us more time but when there’s more time, we tend to do less</li> </ul>	<p>out all the drugs and when they’re due and all that stuff. Now that it’s just right there on the computer, when the MD’s put the orders in, it’s readily available. I don’t have to spend time doing that, therefore it gives me a little bit more time spending time with my patient and taking care of them. (E30-37)</p> <p>There’s pros and cons with it. There’s advantage. Advantage would be if you go back and look at everything it’s there. If the patient forgets to mention you can go back and look through it. Disadvantage, in the fast pace area, time consuming and also sometime when downtime or something the computer is slow and not enough cows or lap tops. (G7-11)</p> <p>Well, the good ways that it influences my job is that I think it gives us a little bit more time. There’s some steps that we don’t have to do because it’s all on the EHR. We don’t have to write out our med sheets. Everything’s a little bit easier. There’s no more paper work involved. The lab slips are generated. The referrals are all generated. Nothing has to be done by hand anymore, so that is saving time. (I12-17)</p> <p>Well it gives us more time to be able to care for the patient rather than doing these things online and looking things up, I mean doing things by hand, manually. (I19-21)</p> <p>It’s a tough one cause I’ve been a psych nurse for 30 years, this has been one of my experiences when there’s more time we tend to do less. The more we do is based on the patient’s demand of us to do more. Either they’re acting out or they’re</p>
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	<ul style="list-style-type: none"> <li>❑ Having the medications in the EMR has made things much quicker</li> <li>❑ Spend less time trying to transcribe orders things like that because it's electronic</li> <li>❑ It has freed up significant</li> </ul>	<p>crying in a corner or they're doing something that demands some attention. If they're all doing pretty well, then we tend to do less and it's partly because in a psychiatric day area or that environment it's not just the nursing staff that's going to make the patient better, it's their peers. I used to find when I worked days housekeeping knew which patient was getting better before the MD did.</p> <p>Housekeeping knew, they told the nurse assistant, the nurse assistant told the nurse. We tell the MD but housekeeping was the first one because they were in out of the rooms and had more of a direct kind of one to one rapport with the patient, so does it give us more time with them, ya, but I don't know that most people sit down and take it. It's kind of a different environment than it was 30 years ago. (H120-134)</p> <p>Having the medications in the EMR has made things much quicker. It has gotten a lot better, I mean that has cut down a lot of time. (J15-17)</p> <p>So to me, the EHR has kind of exposed a lot of new things in health care that need to be addressed so it's meant to free up some of your time so you can spend less time trying to transcribe orders things like that because it's electronic. You don't have to worry about tracking the doctor and trying to find out – what did you mean by this order? So, it's intended to me to be a much more efficient tool although growing pains, well talk about later I guess can be challenging but it seems it made things a lot more efficient as you become used to using them. (K16-23)</p> <p>it has freed up significant amount of</p>
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	<p>amount of time</p> <ul style="list-style-type: none"> <li>❑ Saves a lot of time and it's real easy to use</li> <li>❑ I think it prevents mistakes, get the work done quickly and spend (hopefully) more time with the patient</li> <li>❑ Documentation time is the same because you spend so much time just trying to get to a computer</li> </ul>	<p>time because everything is done electronically. So the time spent, the doctor can sit there and write, put in an order in the computer. It may take him 15 seconds to put that order in and it automatically populates your MAR and goes off to pharmacy so you spend very little time now transcribing orders (K34-39)</p> <p>We just basically go in there to basically say whether or not we've administered the medications and we can put in consults on there, which of course saves a lot of time and fall risk assessments and stuff so it's real easy to use with that. It's easy to get the medications that you need because you can send an eMAR message down to pharmacy. (L18-23)</p> <p>I think it prevents mistakes more so than were made before. If you're not spending as much time on the actual written part, you'll be able to get the work done quickly and spend hopefully more time with your patients (M15-17)</p> <p>I would say it's the same amount of time because you spend so much time just trying to get to a computer, you know. Still, I think people – coz we don't have ready access all the time, we still waste so much paper making copies so we can have something in your hand to carry around. (J19-22)</p>
Efficiency	<ul style="list-style-type: none"> <li>❑ The new system is more detailed</li> <li>❑ Accurate and efficient way of documenting</li> <li>❑ It's better, more efficient</li> </ul>	<p>Um, this one is a little more detailed, um has, what I think it might get better once the clicks get out of it, but right now it's a little bit more time consuming with the other one, because the other one was probably was in use longer. (A21-24)</p> <p>Oh I think that it's good. (A26)</p> <p>I think it's better. It reminds you of</p>

	<p>□ Makes you more efficient</p>	<p>certain things when you're looking at your documentation on the computer. Like um, it informs you time wise of how, how efficient turn over is and um how like um, how it has a screen on there, which reminds you of what you need for the case. You can actually pull down your trays and your supplies needed for a certain case - they're surgeon specific. I think in terms of care it makes it more efficient. (C12-18)</p> <p>It's more forward in terms of patient care and um, because not only is it an advance in technology and all that, I think it makes you more efficient in terms of time management and completeness and getting more prepared for a certain case especially when you're not in a service that you need to</p> <p>Then you can forward. I mean it'll tell you what you need, so I think it makes you more efficient. (C20-25)</p> <p>I think it's just makes you more efficient, because instead of calling, you know like when you want to know where your patient is, where your next patient is at a certain time, instead of calling you can just press your menu and look at the whole OR schedule and you'll see where she is at that time if she's in transit, if she's in holding, so you won't have to keep calling to see if your patient is there. You know when, you don't have to be asking a whole bunch of people about stuff, you can just pull down the menu and</p> <p>it'll be there for you especially during relief you know if you're, if the nurse you're relieving is busy and then you can just look at the computer and see what's on there, see what time they</p>
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	<ul style="list-style-type: none"> <li>□ The new system is quicker (...because everything's there for you)</li>   <li>□ Makes things quicker</li>   <li>□ I think it's a good system</li>   <li>□ I think it's going to be a little bit easier – access charts, easier to type, easier to read MDs orders, understand better the plan of care</li> </ul>	<p>started, what they're doing. You don't have to get a long verbal report. You can just do it yourself, get Your own report. You see what tubes they've put in already, what they did to the patient while you weren't there, so I think it's a more efficient system. (C36-49)</p> <p>The epic's been better, it's been better, it's quicker. (B47)</p> <p>Once you get used to it makes it much quicker because everything's there for you. (B101-102)</p> <p>On the emar, on the medication because we use that the most it's so nice to be able to put it right in there. It's already there and you just put it in and it has the times so you know exactly when you did something. (B104-106)</p> <p>Makes things quicker because as long as the computer is up, you just click on the patients name and all the information is just right there. (D8-9)</p> <p>You have more time for the patient because the documentation is just read through and click and move on, so it's quicker, make more time for the patient. (D13-14)</p> <p>It's quicker. (D17)</p> <p>I think it's a good system and they gave us opportunities to evaluate it and everything and I gave it pretty high ratings because I like the system, ya. (E96-97)</p> <p>I think it's going to be a little bit easier like I was stating with the admission process it's going to make it a little bit easier. I won't have to ask the repetitive questions if there is a question that I'm not clear about I will ask it again, but I think it will probably save some time and once I think we put the vital signs and</p>
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	<ul style="list-style-type: none"> <li>□ If everybody uses it like it should be, it's very accurate.</li>   <li>□ It's double charting for right now - We're still using the paper record and also the electronic</li>   <li>□ In my mind, it speeds it (giving</li> </ul>	<p>everything on it it's going to be easier to click it and look and you know be able to access it more easily because sometimes your charts are floating here and there and it's so hard sometimes to find them or you just you know, I don't know, sometimes there's just not time to sit down and write in your charts and stuff but it's easier for me to type you know and my handwriting's not all that you know, my handwriting's ok you know but some of the MDs you can't read what they write and if they type it, I'm gonna be able to read it you know which is going to make my job a little bit easier. I'll be able to better understand the plan of care that we're doing because I'll be able to read what they're putting in, at least I hope that's the way the system is going. (E136-150)</p> <p>If everybody uses it like it should be, it's very accurate. (F53)</p> <p>Sometimes they forget to document a medication or so, even though we know it's been given we can talk to the patient or even contact the nurse and update it. We're able to go back and update within 48 hours, so it's pretty accurate. (F55-58)</p> <p>The care of patient is, I would say most of my care is bed side and I say at bed side. Record wise I kind of jot it down and go back to it when I have free time in between, so I would say it's double charting for right now because we're still on using paper. We're still using the paper record and also the electronic, so it's double charting cause we have to chart here and there. (G15-20)</p> <p>Mostly at this point we use it just for</p>
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	<p>medicines out to patients) up a little bit.</p> <ul style="list-style-type: none"> <li>□ Helps nurses to focus a little bit more on the care</li> <li>□ It's intended to save paper but nurses are still reluctant to use the computer for their entire rounds report so they can navigate</li> <li>□ I don't think that some of the doctors have been trained enough on how to use it.</li> <li>□ It's definitely more efficient – the orders are correct and legible so that helps</li> </ul>	<p>medications. In psychiatry there's not an awful lot of IVs. There's not a great number of tests, those sorts of things. Mostly it's just getting medicines out. In my mind it speeds it up a little bit. It's easier to be able to get access to what medications the patient can have. It's easier to chart it. It's easier to keep track of it.(H9-13)</p> <p>I think to some extent, it helps nurses to focus a little bit more on the care. The anxiety level is really high for the nurses, initially and to some extent a little bit still is. Many of the nurses I work with are in their 60's and 70's. They're not comfortable with computers. Some of them aren't comfortable with typing, so when it sort of got introduced it wasn't just a new system it was also the challenge of having to practice your typing and having to learn how a computer works. (H25-31)</p> <p>It's intended to save paper but nurses are still reluctant to use the computer for their entire rounds report so they can navigate (K85-87)</p> <p>I don't think that some of the doctors have been trained enough on how to use it. A lot of times they have orders in there that they didn't - that's not put in there right, how they meant to. You have to call them and clarify, or some of them just seem to not know how to input orders into it. It's just a few doctors but they'll call you and they have us put them in, which of course takes up more time. (L47-52)</p> <p>The former system was written so it's definitely more efficient. The orders, if they're typed in by the doctor the</p>
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		orders are gonna be definitely correct and legible so that helps. If it's given to the nurse by phone, that can cause problems as far as getting it entered correctly. (M19-22)
Safety	<ul style="list-style-type: none"> <li>❑ I can read the handwriting!</li>   <li>❑ It's much easier and safer</li>   <li>❑ I think it's going to be a little bit easier – access charts, easier to type, easier to read MDs orders, understand better the plan of care</li> </ul>	<p>Yeah, I can read the handwriting! It's all printed out instead of the Written. I can go back to written times when you had to decipher what the physicians wrote so this has been much easier of course the older physicians, we have one though he's doing really well. He's learning the system. (B54-58)</p> <p>I like this. We'll be able to read physician's handwriting, this is what 'coz sometimes trying to go through notes trying to find history for patients it's so hard because it's still hand written so that will make it much easier and much safer 'coz we'll know exactly instead of trying to. (B93-96)</p> <p>I think it's going to be a little bit easier like I was stating with the admission process it's going to make it a little bit easier. I won't have to ask the repetitive questions if there is a question that I'm not clear about I will ask it again, but I think it will probably save some time and once I think we put the vital signs and everything on it it's going to be easier to click it and look and you know be able to access it more easily because sometimes your charts are floating here and there and it's so hard sometimes to find them or you just you know, I don't know, sometimes there's just not time to sit down and write in your charts and stuff but it's easier for me to type you know and my handwriting's not all that you know, my handwriting's ok you</p>



	<ul style="list-style-type: none"> <li>❑ If everybody uses it like it should be, it's very accurate.</li>   <li>❑ The best advantage is the time part of it and everything being right there</li>   <li>❑ Sometimes our nurses will forget to document, that they gave the medicine.</li>   <li>❑ If you failed to chart your medicine or failed to acknowledge the orders, its easy to find out who did it</li> </ul>	<p>have come up. (B269-274)</p> <p>If everybody uses it like it should be, it's very accurate. (F53)</p> <p>Sometimes they forget to document a medication or so, even though we know it's been given we can talk to the patient or even contact the nurse and update it. We're able to go back and update within 48 hours, so it's pretty accurate. (F55-58)</p> <p>The best advantage is the time part of it and everything being right there. It's not going to be lost. It's not paper than can get lost. It's more readable as far as MD's orders go. You can know what physician's name is, how to get a hold of them, exactly what their name is. Those are the main things. You're gonna have your orders are gonna be readable too. You're going to be able to read the orders and there shouldn't be as many mistakes. (I 32-38)</p> <p>Between nurses, the only thing that I can see is with the medication record and even sometimes our nurses will forget to document, write, to type in if they gave the medicine. If it's a narcotic we have on pyxis that they gave it, so we have a little back up there with the narcotics. (I59-62)</p> <p>We have to let them know that they need to put it down. We have to leave the nurses a note or leave our nurse manager a note that the nurse didn't do it, that she needs to come back and do it. Cause it needs to be put in. (I64-66)</p> <p>when you sign off the computer and ok again they can track down who did what, so if you failed to chart your medicine or failed to acknowledge the orders, it's easy to find out who did it. Generally when</p>
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	<ul style="list-style-type: none"> <li>□ From a quality perspective your risk of dosing somebody with something that should not be on the MAR is reduced significantly</li>   <li>□ It has created a safer environment</li> </ul>	<p>you're getting ready to turn off the computer it kind of queues you and you think towards, have I got everything down and then you just stand up and leave. The next person can without having to find papers and forms, the chart, the medical students have the chart, someone else has the chart, you can't find it. So yes it does make it, the flow between shifts, 12 hour shifts works easier, 16 hour, 8 hour, they all flow easier. (H109-111)</p> <p>Well, I think it has improved quality of care because you – things are real time so you don't have the doctor that sits there. Well if they write the order in real time it shoots off to pharmacy so you get stuff back very quickly. Things populate your MAR – real time. So, from a quality perspective your risk of dosing somebody with something that should not be on the MAR is reduced significantly. So to me, it's a much safer tool than the former pen and paper nursing kardex type stuff that we used to use. (K25-32)</p> <p>it has created a safer environment, your medication when you change level of care of a patient from one area to another, those medications are flagged for the physician to indicate whether they want to continue or not on transfer, which is a requirement of JCAHO. So it's facilitated that. It has proven, I feel to have saved us a lot of time. It's made retrieval of information about medication administration easier because you just go in the computer and scan back. You don't have to go and grab the chart and look through multiple pages. If the patient is in our unit, we</p>
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	<ul style="list-style-type: none"> <li>□ That (eMAR) cuts back on a lot of mistakes from either all out missing orders or not being able to read the orders</li>   <li>□ I think it prevents mistakes, get the work done quickly and spend (hopefully) more time with the patient</li> </ul>	<p>can pull the chart and go through it. But it's much easier to know that you can be at any computer in the hospital and pull it up or for that matter at your home for physicians and they can see exactly what is administered and what has not. (K73-84)</p> <p>we just have the medication administration record in there and I think that cuts back on a lot of mistakes from either all out missing orders or not being able to read the orders – things like that. It's a lot easier, you can go in there and just print everything and you know when exactly everything is due and your doses and everything and of course it's easy to read. (L9-14)</p> <p>I think the advantages – the orders being in there and we knowing there is not a chance of us misreading it, which I think is a great advantage. (L45-46)</p> <p>I think it prevents mistakes more so than were made before. If you're not spending as much time on the actual written part, you'll be able to get the work done quickly and spend hopefully more time with your patients (M15-17)</p>
Nature of Work	<ul style="list-style-type: none"> <li>□ Follows the workflow in my unit</li> <li>□ Makes it easier with labs</li> </ul>	<p>Yes. It's going along real well as far as that (unit workflow). (A49)</p> <p>Makes it easier with the labs, we can instead of having to call and wait the results are there so that we can work better, I work as a telemetry resource nurse so I work outside of our unit on the other floors with patients that are on tele so if they need to be moved to our unit, so if labs are up or elevated. (B14-18)</p> <p>Yeah, but this way we say their labs and if the troponin or their CKs specifically cardiac those enzymes</p>

	<ul style="list-style-type: none"> <li>❑ Helped tremendously in getting meds to patients</li>   <li>❑ Documentation is more complete</li>   <li>❑ Constantly check for new orders</li>   <li>❑ It's user friendly</li>   <li>❑ I start my shift out looking at the computer so I know what my plan of care is going to be</li> </ul>	<p>are elevated we get them to where they need to be. (B33-35)</p> <p>I'm trying to think. Probably shortened it because we're not having to do all the transcribing because it's already in the computer and since we've done now gone to the same system where our pharmacy's working Within the same system, it's helped the time tremendously of getting meds To the patients. (B38-42)</p> <p>Um, I think now that we're used to it, it's lesser time. I wouldn't say lesser time, it's about equal. I think this way because it's in the computer and it won't close for you, so your documentation is more complete. (C7-9)</p> <p>The only difference is I really see the old system when MDs wrote in orders a page printed out on the computer, I missed that cause now I have to check the computer constantly to see if my patients have new orders. (D20-22)</p> <p>All the time because especially if there's a lot of MDs coming through and I know they've been checking my patient, I make sure I check that patient's chart all the time. (D24-26)</p> <p>Mm hm, because the medication record it... It's like 7 to 7.</p> <p>I mean it's just you took on your time and there it is for your shift, so it's user friendly. (D49-51)</p> <p>Well, I, typically the way I start my day is I will go to the computer and I print out the rounds because a lot of times I don't have time to just be at the computer, so I print out the rounds to have something to look at, to fall back on and I place it on my chart, but I look up my medications</p>
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	<ul style="list-style-type: none"> <li>□ The Epic system seems better and easier to follow (and take verbal orders)</li>   <li>□ It is now... (congruent) to workflow. We wanna see 12 hrs. and they listened and upgraded the system</li> </ul>	<p>as well and find out when their due times are and that way I just kind of transform  it to my little cheat sheet and then when I go to present the plan to the patients, I have my cheat sheet with me; I know what my plan is for them, that way I can describe to them what our plan of care is going to be for my shift and when medications are going to be given, whether the patient is going to be in PO or what kind of diet they can have; that's how I basically use it. I start my shift out looking at the computer, so that I know what my plan of care is going to be, before I go actually assessing. (E15-26)</p> <p>The older documentation wasn't so much by exception. They've changed our format for our paper part of it. The epic system it just seems better and it's easier to follow as long as the orders are good. Sometimes when the MDs don't go back in and change the things that we need that makes a little bit more difficult. It's also easier for us to take verbal orders and to do a verbal order on the computer. If we wanted to, if the MD wanted to modify the time that the specific times that we could give, it's easier to go in and modify it than having to write a whole new order and it's really easy to put in an actual verbal order to me. (E52-60)</p> <p>It is now (12 hrs). They did take some of our feed back like when we're working 12 hour shifts on the emar it was just showing us 8 so we would end up having to click over to the next 8 hours or the next 8 hours and they listen to our evaluations to where we told them you know when we pull up our medication record we</p>
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	<ul style="list-style-type: none"> <li>□ It's (workflow &amp; time management) about the same</li>   <li>□ When I know I'm getting a patient, I usually look up demographics, problem list, history of chest pain and previous medications</li>   <li>□ The flowsheets are pretty good...working pretty well I like this system very well...it's very user friendly.</li> </ul>	<p>wanna be able to see the full 12 hours. We don't just wanna see 8. We wanna see 12 and they listened to us and they upgraded the system to where that's what we can see now and it makes it a lot easier you know so it's, they're listening to us and you know getting our input and it makes us feel like, well it makes me feel like they're actually listening and you know things can change you know. (E103-112)</p> <p>I guess it's about the same. (A346)</p> <p>Me personally, I don't think it does a difference either way. (A350)</p> <p>But, I mean I'm an experienced person. I had it down pat the other way, so this it I mean, it will probably be more efficient. But, right now I see it as probably about the same, but I think it will be more. (A352-354)</p> <p>When we get first get a patient or when I know I'm getting a patient I usually look it up as far as their demographics, where they live, that doesn't take any count of how I take care of the patient, but I get ready for the paper work to get the patient up and the problem list, what he has had in the past to see where it stands on our unit or if he's coming in with chest pain or if he's had chest pain before and the previous medications he was on, we can review that. (F11-17)</p> <p>Yeah, the insulin flow sheets are pretty good. They have two different flow sheets in the system. One you can write down the medication format, so you have it at the top of the sheet and the other one is just a plain flow sheet. We have flow sheet for coumadin and we have a flow sheet for PTT, for the heparin and it</p>
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	<p>□ It's double charting for right now - We're still using the paper record and also the electronic</p>	<p>seems to be working pretty well. (F106-110)  Let's see benefits, well medication I like this system very well. Where I came from we had just implemented a system where we had to scan bracelets and then scan medications. (F61-63)  In Beaumont. That was kind of a hassle and we have an hour to get the meds out and if you had five patients the hour is overdue and then you have to put a reason why it's overdue. (F65-67)  The care of patient is, I would say most of my care is bed side and I say at bed side. Record wise I kind of jot it down and go back to it when I have free time in between, so I would say it's double charting for right now because we're still on using paper. We're still using the paper record and also the electronic, so it's double charting cause we have to chart here and there. (G15-20)  An hour. I mean from the time you started you had a hour before and within that hour it was given depending what happened it that time frame. Sometimes the patients are gone, so you weren't able to get the medications and then they want to know the reason why. This system here, you can pick a time, anytime they come back and it's overdue until you pick that time and it updates it automatically, so it seems very user friendly. It's not as bad as the other system. (F69-75)  Not really any drawbacks. We're understanding more about when we're getting the meds from the pharmacy which is, when the pharmacy puts in the med or the dr</p>
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	<ul style="list-style-type: none"> <li>□ It is within the flow during my shift. It's just getting there, when the turnover is fast we kind of tend to just let go of it</li>   <li>□ I don't necessarily have to weigh down another nurse going to the medication book (decreases documentation time)</li>   <li>□ The flow between shifts is easier</li>   <li>□ We can look at it at one time without being in the same place with the chart and not looking for the chart all the time</li> </ul>	<p>orders the med they put the time in now. You might not get the medicine for a couple hours, but it still doesn't, you can take that time and update it and it doesn't reflect it's overdue once you put the medication in, once the patient has got it. (F77-82)</p> <p>It is available and I think it is within the flow during my shift. It's just getting there, going into the records and putting it in everything in and also what do you call this, like I said the double charting and the turn over when it's fast sometimes we kind of tend to just let go of it since we have the paper documentation at this time. (G51-55)</p> <p>I don't necessarily have to weigh down another nurse going to the medication book. I can go to different terminal, pull up what they need. Likewise with, it makes it a little bit easier, little bit friendlier, but again as far as time goes it increases our time, but I don't see too much of it because I encourage them to sleep. (H19-23)</p> <p>Generally when you're getting ready to turn off the computer it kind of queues you and you think towards, have I got everything down and then you just stand up and leave. The next person can without having to find papers and forms, the chart, the medical students have the chart, someone else has the chart, you can't find it. So yes it does make it, the flow between shifts, 12 hour shifts works easier, 16 hour, 8 hour, they all flow easier. (H112-118)</p> <p>it's much more legible, much more accessible, and we can look at it at one time without being in the same place with the chart and not looking</p>
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	<ul style="list-style-type: none"> <li>❑ They changed it to the 12 hour shifts which makes it much better</li> </ul>	<p>for the chart all the time. I look forward to the day when we do everything like that. (J33-36)</p> <p>We usually work 12-hour shifts and at first we were at 8 hour shift increments that did not work very well and they changed it to the 12 hour shifts which makes it much better. I like that. (J89-91)</p>
<p>Communication and information Access</p>	<ul style="list-style-type: none"> <li>❑ Good communication between health care personnel</li>   <li>❑ We can all see the same thing, have access to it, and no deciphering</li>   <li>❑ Communication is more direct</li>   <li>❑ I like being able to have easy access to it</li> </ul>	<p>I think that's probably, that's good, I mean on this unit we don't kind of use that a lot because our's is kind of routine and it's, we don't have so much in between different deals like a med surgical, but what I've seen of it and the little that we've done I think that's excellent. (A29-32)</p> <p>We can all see the same thing which is nice and there's no trying to figure you know like I said the deciphering, I felt I said I that and I got this so it's all there and contact and all of us have access to it. (B61-B63)</p> <p>Well, I think it's more direct because everybody sees the same thing. I don't have to flip through progress notes to see, it's just right there in the computer and everybody can view it, so if it's related to your patient. (D35-37)</p> <p>I definitely like the epic system better. Maybe I wasn't so familiar with the older system, but with the older system you couldn't document when you gave your drugs. You had to write them off initially, whereas with the epic system I can go in there and verify my drug amounts and I can just click and I've signed it off and I just really like that. I like being able to have easy access to it and I don't have to go find my chart if somebody else has got it doing something with it. I can just look</p>

	<ul style="list-style-type: none"> <li>□ Being able to look up medications and being able to text pharmacy (if it's missing)</li>   <li>□ It does increase communication, we can look and see ok</li> </ul>	<p>right there on the computer, ok yeah, this is the drug I'm giving, this is the right dose, right patient and all that stuff. I definitely like epic much better than the other system. (E41-49)</p> <p>The advantages is being able to look up medications and being able to text pharmacy and say hey my medication isn't here. I need one. I got a missing dose or I need some more IV fluid instead of having to pick up the phone and call pharmacy and tell them my medication isn't here and have to call them 3 times, you know at least with the emar we can just click on that little RX and tell them hey my missing dose, I need one stat and if it's not, if they send it up within like 30 minutes, then I get on the phone to call them</p> <p>I think in that aspect it saves me a lot of time from getting on the phone and being on hold. (E313-322)</p> <p>It's influenced by the fact that we can look and see ok, we don't even have to put our name and password and we can see that there's a new order you know and you say oh somebody's got a new order and it's not really showing the patient's name or anything like that and then we have to put in our name and password, but we know that somebody's got a new order and if I'm in charge I can let the person taking care of that patient know, hey you've got a new order, check it out, because the MDs don't always communicate I've put in a new order you know and um it doesn't print off the computer or anything like it did with the old system to let us know hey you have a new order, but I think you know with</p>
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	<ul style="list-style-type: none"> <li>□ Better effect on patient care. You can keep checking and they (MDs) keep a better understanding of what's going on</li>   <li>□ The communication (w/ MDs) is pretty good...it's getting better</li> </ul>	<p>the little flag it does increase the communication but we still need more communication between the MDs and the nurses because they'll come in and put in orders and don't like to tell you about it you know and it might be a stat thing. I need some blood work you know. Ok I'm already in there drawing blood, but you know you wanted something else and you didn't communicate that with me you know. They kind of sometimes fall behind and you know don't always communicate with us and if I'm in there drawing blood I'm not looking at the computer then because I've already pulled it up and seen they wanted this but they you know 5 minutes later come back and wanted something else, so that communication part still needs a lot of work you know. I think when the MDs put in the orders for like labs and stuff, they need to make sure they put it in for everything you know. (E64-85)</p> <p>Right, within the hospital. Some of them even have them at their home, so you keep checking and they keep a better understanding of what's going on and lab puts in the results of any lab work, so they can usually check or we check. On the cardiac unit, a lot of the people are on drips and stuff and we have to keep a view of what their lab work results are compared to what their drip is going at. (F37-42)</p> <p>Sometimes, with any new system everybody is learning how to use everything and some of the MDs weren't familiar with it, some of the nurses weren't familiar with it when it first started. Now it's getting a little better if, I've been here since it</p>
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	<ul style="list-style-type: none"> <li>□ (With) Pharmacy, right at first was a hassle getting started...but now, it's getting to where there's better understanding</li> <li>□ In a fast turnover unit, we just go get verbal orders most of the time – just do it and remind them (MDs) to put it in – sometimes it's not there</li> <li>□ It improves the communication - at the disadvantage of distancing, making it a bit more impersonal.</li> </ul>	<p>started, so a couple years and if I've seen a medication or a dr order the medication wrong, I contact him and let him know and they usually pretty good about correcting. The communication is pretty good. (F86-92)</p> <p>Pharmacy, right at first it was a hassle getting started because the nurses didn't understand that the pharmacy had so much time, say 2 hours to give a routine meds when they, one of the meds they would email the pharmacy and that would slow things up, but now it's getting to where it's better understanding, they have two hours to get your medication there, then if it's not, if they are two hours then you can start calling or emailing them. (F94-99)</p> <p>Nurses and MDs, it's just in our unit like I said fast turn over, fast pace. The MDs are basically taking everybody, taking care of everybody in the unit. We just go get verbal orders most of the time and just do it. Just do it and later on remind them to put it in or if we ourselves have the time to put the orders in then we will put it in as a verbal order. That kind of, sometimes there's just times they forget to really put it in. They'll say yes we will put it in, but it's not there. (G38-44)</p> <p>Distancing the 2 people who would normally see each other face to face or talk on the telephone or develop some kind of rapport. You just type this in and it's gone. You don't ever see the other person. So it speeds it up, but with some drawback. Again, in psychiatry most everything is based on our relationships. The more you do to distant yourself from other</p>
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	<ul style="list-style-type: none"> <li>□ On the eMAR we can send a message to the pharmacy when we need something</li>   <li>□ Sometimes our nurses will forget to document, that they gave the medicine.</li> </ul>	<p>staff members, the less relationship and the system may work a little smoother, but not necessarily the therapeutic environment. I mean there's people I've been working with for years and I don't know their names. Not directly with me, but people in occupational therapy, recreational therapy. I know they're there and to say hi and I know what field they're in, but I don't know their name, it just never comes up. (H47-57)</p> <p>Well on the emar we can send a message to the pharmacy when we need something. I don't know if that has really helped us at all because we usually have to call them on the phone and that part of it I don't like because I think that is a mistake. We should just call them. We shouldn't even have to fax them, send them a piece of paper because it's a big waste of our time in that affect cause they don't, I don't know how they do that. We end up having to send it, wait 30 minutes or more, send another message and then we call them and then we have to wait again, so it still take a few hours to get a needed medication. (I44-52)</p> <p>Between nurses, the only thing that I can see is with the medication record and even sometimes our nurses will forget to document, write, to type in if they gave the medicine. If it's a narcotic we have on pyxis that they gave it, so we have a little back up there with the narcotics. (I59-62)</p> <p>We have to let them know that they need to put it down. We have to leave the nurses a note or leave our nurse manager a note that the nurse didn't do it, that she needs to come back and do it to put it in. (I64-66)</p>
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	<ul style="list-style-type: none"> <li>❑ We can communicate to the pharmacy but we don't have anyway of knowing – it doesn't time stamp it</li>   <li>❑ Communication between nurses and pharmacy seems to be getting better – turnaround time between sending eMAR message and getting medication is better</li>   <li>❑ It is easier to communicate with pharmacy if you're missing medications</li> </ul>	<p>I think that there are some flaws with that, we can communicate to the pharmacy but we don't have anyway of knowing – it doesn't time stamp it or we can't have a way of going back and looking at it. We know we sent it and we call them on the phone and say, "Did you get it?" We're talking about missing medications. They'll say, "What time did you send it?" Well unless I document on there you know missing med requested at- I don't have any way of knowing when I sent it. I wish there was a way to go back and see it. And you know...just show requested now and again...((J50-57)</p> <p>I think the main thing it's communicating between is nurses and pharmacy, which seems to be getting better. The turn around time between sending an eMAR message and getting the medication up and also on the consults that we put in. I think it's a big time saver because we send it off and we know that they've gotten it like infusion therapy or you know the clergy or anything like that – I think it saves a lot of time on that end. (L58-63)</p> <p>It is easier to communicate like if you're missing medications from pharmacy. Instead of talking to them and getting transferred here and there, you can just send them an eMAR message to them and it goes directly there and once we get it started, the medications do come up quickly. Like yesterday I put in a PT consult and that automatically went to social work and it all just goes where it needed to go just by putting them on that little thing – and it's efficient. (M31-37)</p>
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### Sample Codebook 3 (Theme 2)

Themes	Sub-themes	Descriptions (instances) from the Narratives
EHR Dimensions of Influence on Nursing Practice and Patient Outcomes	1. <u>Time</u>	<ul style="list-style-type: none"> <li>❑ Gives me less time (initially) (A8) (A12-15)</li> <li>❑ Takes an extra bit of time to catch up (A51-57)</li> <li>❑ Eventually, it will save time (A69-71)</li> <li>❑ You have to wait until the physician puts the orders in (B265-267)</li> <li>❑ The patient has left the room (O.R.) and we're still charting (C129-139)</li> <li>❑ Saves you more work later on and makes your charting more complete (C175-185)</li> <li>❑ More time for patient (D13-15)</li> <li>❑ It gives me a little bit more time spending time with my patient and taking care of them (E30-37)</li> <li>❑ You can go back and look – everything's there. But in a fast pace area, it's time consuming (G7-11)</li> <li>❑ It does give us more time but when there's more time, we tend to do less (H120-134)</li> <li>❑ It gives us a little bit more time...it is saving time (I12-17)</li> <li>❑ It gives us more time to care for the patient (I19-21)</li> <li>❑ Having the medications in the EMR has made things much quicker (J15-17)</li> <li>❑ Spend less time trying to transcribe orders things like that because it's electronic (K16-23)</li> <li>❑ It has freed up significant amount of time (K34-34-39)</li> <li>❑ Saves a lot of time and it's real easy to use (L18-23)</li> <li>❑ I think it prevents mistakes, get the work done quickly and spend</li> </ul>

		<p>(hopefully) more time with the patient (M15-17)</p> <ul style="list-style-type: none"> <li>❑ Documentation time is the same because you spend so much time just trying to get to a computer (J19-22)</li> </ul>
	<p>2. <u>Efficiency</u></p>	<ul style="list-style-type: none"> <li>❑ The new system is more detailed (A21-24)</li> <li>❑ Accurate and efficient way of documenting (A26)</li> <li>❑ It's better, more efficient (C12-18)</li> <li>❑ Makes you more efficient (C20-25), (C36-49)</li> <li>❑ The new system is quicker (...because everything's there for you) (B47), (B101-102), (B104-106)</li> <li>❑ Makes things quicker (D8-9) (D17) (D13-14)</li> <li>❑ I think it's a good system (E96-97)</li> <li>❑ I think it's going to be a little bit easier – access charts, easier to type, easier to read MDs orders, understand better the plan of care (E136-150)</li> <li>❑ If everybody uses it like it should be, it's very accurate. (F53) (F55-58)</li> <li>❑ It's double charting for right now - We're still using the paper record and also the electronic (G15-20)</li> <li>❑ In my mind, it speeds it (giving medicines out to patients) up a little bit. (H9-13)</li> <li>❑ Helps nurses to focus a little bit more on the care (H25)</li> <li>❑ It's intended to save paper but nurses are still reluctant to use the computer for their entire rounds report so they can navigate (K85-87)</li> </ul>

		<ul style="list-style-type: none"> <li>❑ I don't think that some of the doctors have been trained enough on how to use it. (L47-52)</li> <li>❑ It's definitely more efficient – the orders are correct and legible so that helps (M19-22)</li> </ul>
	<p>3. <u>Safety</u></p>	<ul style="list-style-type: none"> <li>❑ I can read the handwriting! - safety (B54-58)</li> <li>❑ It's much easier and safer (B93-96), (B98)</li> <li>❑ I think it's going to be a little bit easier – access charts, easier to type, easier to read MDs orders, understand better the plan of care (E136-150)</li> <li>❑ It saves time and has less human error (A332-334) (A336-338) (A340-343)</li> <li>❑ It's nice to have the alerts and highlights – tells you to address it (issues, e.g. Meds) (B269-274)</li> <li>❑ If everybody uses it like it should be, it's very accurate. (F53) (F55-58)</li> <li>❑ The best advantage is the time part of it and everything being right there (I 32-38)</li> <li>❑ Sometimes our nurses will forget to document, that they gave the medicine. (I59-62) (I64-66)</li> <li>❑ If you failed to chart your medicine or failed to acknowledge the orders, its easy to find out who did it (safety, accuracy) (H109-111)</li> <li>❑ From a quality perspective your risk of dosing somebody with something that should not be on the MAR is reduced significantly (K25-32)</li> <li>❑ It has created a safer environment (K73-84)</li> <li>❑ That (eMAR) cuts back on a lot of mistakes from either all out</li> </ul>

		<p>missing orders or not being able to read the orders (L9-14) (L45-46)</p> <ul style="list-style-type: none"> <li>❑ I think it prevents mistakes, get the work done quickly and spend (hopefully) more time with the patient (M15-17)</li> </ul>
	<p>4. <u>Nature of Work</u></p>	<ul style="list-style-type: none"> <li>❑ Follows the workflow in my unit (A49)</li> <li>❑ Makes it easier with labs (B14-18), (B33-35)</li> <li>❑ Helped tremendously in getting meds to patients (B38-42)</li> <li>❑ Documentation is more complete (C7-9)</li> <li>❑ Constantly check for new orders (D20-22) (D22-26)</li> <li>❑ It's user friendly (D49-51)</li> <li>❑ I start my shift out looking at the computer so I know what my plan of care is going to be (E15-26)</li> <li>❑ The Epic system seems better and easier to follow (and take verbal orders) (E52-60)</li> <li>❑ It is now... (congruent) to workflow. We wanna see 12 hrs. and they listened and upgraded the system (E103-112)</li> <li>❑ It's (workflow &amp; time management) about the same (A346) (A350) (A352-354)</li> <li>❑ When I know I'm getting a patient, I usually look up demographics, problem list, history of chest pain and previous medications (F11-17)</li> <li>❑ The flowsheets are pretty good...working pretty well (F106-110)</li> <li>❑ I like this system very well...it's very user friendly. (F61-63) (F65-67) (F69-75) (F77-82)</li> <li>❑ It's double charting for right now</li> </ul>

		<p>- We're still using the paper record and also the electronic (G15-20)</p> <ul style="list-style-type: none"> <li>❑ It is within the flow during my shift. It's just getting there, when the turnover is fast we kind of tend to just let go of it (G51-55)</li> <li>❑ Epic is much more advanced (than the previous system) (I26-27)</li> <li>❑ We can look at it at one time without being in the same place with the chart and not looking for the chart all the time (J33-36)</li> <li>❑ They changed it to the 12 hour shifts which makes it much better (J89-91)</li> </ul>
	<p>5. <u>Communication and information access</u></p>	<ul style="list-style-type: none"> <li>❑ Good communication between health care personnel (A29-32)</li> <li>❑ We can all see the same thing, have access to it, and no deciphering (good communication) (B61-B63)</li> <li>❑ Communication is more direct (D35-37)</li> <li>❑ I like being able to have easy access to it (E41-49)</li> <li>❑ Being able to look up medications and being able to text pharmacy (if it's missing) – advantages (E313-322)</li> <li>❑ It does increase communication, we can look and see ok (E64-85)</li> <li>❑ Better effect on patient care. You can keep checking and they (MDs) keep a better understanding of what's going on (F37-42)</li> <li>❑ The communication (w/ MDs) is pretty good...it's getting better (F86-92)</li> <li>❑ (With) Pharmacy, right at first was a hassle getting started...but now, it's getting to where there's</li> </ul>

		<p>better understanding (F94-99)</p> <ul style="list-style-type: none"> <li>❑ In a fast turnover unit, we just go get verbal orders most of the time – just do it and remind them (MDs) to put it in – sometimes it’s not there (G38-44)</li> <li>❑ On the eMAR we can send a message to the pharmacy when we need something (I44-52)</li> <li>❑ Sometimes our nurses will forget to document, that they gave the medicine. (I59-62) (I64-66)</li> <li>❑ We can communicate to the pharmacy but we don’t have anyway of knowing – it doesn’t time stamp it ((J50-57)</li> <li>❑ Communication between nurses and pharmacy seems to be getting better – turnaround time between sending eMAR message and getting medication is better (L58-63)</li> <li>❑ It is easier to communicate with pharmacy if you’re missing medications (M31-37)</li> <li>❑ The pharmacy is kind of insulated themselves in the responses they give you. In the drop down menu there is no reason for a missed dose that says – it’s not here. (N75-78)</li> </ul>
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## VITA

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### Summary of Dissertation

The overall goal of this dissertation study was to explore and describe the lived experiences of nurses working with Electronic Health Records (EHR). Since U.S. President Bush's 2004 mandate to put EHRs in place by 2014, EHR design and implementation have become priorities for all health care organizations. Research studies of EHR implementation and utilization found in the literature reveal a fifty-percent failure rate among organizations and institutions that attempt to adopt and sustain EHR use in their facilities.

While nurses are the largest group of health care providers who use health information systems and can influence their adoption and utilization outcomes, few nurses have been included in planning, researching, and implementing the EHR. Several studies report nurses' uses of computers in the workplace, however few have examined the subjective lived experiences of nurses whose daily work is affected by organizational, technological, educational, and behavioral factors associated with EHR system conversion and implementation. The study reported here fills a gap in knowledge by

adding the subjective lived experiences of EHR nurses to the larger body of knowledge that addresses information system changes and their influences upon nursing practice and patient care outcomes.

Using a phenomenology of practice research approach, a purposive sample of 14 nurses with EHR experiences was enrolled. Data were collected during interviews with the investigator until saturation and redundancy were achieved. Assigning code letters, interviewing participants in private places, and maintaining all study materials in locked files were methods used to protect identities and confidentiality. Interview data were transcribed, coded, and clustered during thematic analysis procedures guided by Martins (1992).

Findings revealed three emergent themes that captured the meanings of the participants' descriptions of *Phases of EHR Experiences*, *Dimensions of EHR Influence*, and *Future Improvements*. Twelve sub-themes supported by instances of data found in the narratives formed the knowledge used to induct the three themes. Truth value and scientific rigor of the study were evaluated using the standards of: (1) descriptive vividness, (2) methodological congruence, (3) analytical preciseness, (4) theoretical correctness, (5) heuristic relevance (Burns & Grove, 2005) and (6) Lincoln & Guba's (1985) criteria of trustworthiness.