

THE ELECTRONIC HEALTH RECORD FUNCTIONALITIES IN HOSPITALS WITHIN
THE STATE OF KANSAS WITH REGARD TO NURSING PRACTICE

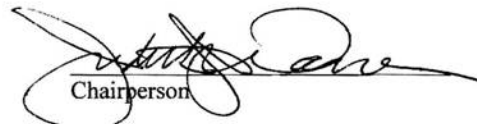
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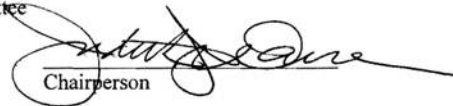

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Abstract

The purpose of this study was to identify the electronic health record functionalities of acute care hospitals in the state of Kansas with regard to nursing practice. From the perspective of the Chief Nursing Officer, what was the nurses' role in implementation of the electronic health record, what nursing documentation was in the electronic health record, and what factors led to the acceptance of the electronic health record by the nursing staff? It was also concerned with how, as the Chief Nursing Officer, the perception of their social capital might affect the implementation of their electronic health record. A survey was developed for this descriptive study to quantify the components of individual hospital's electronic health record, using the theoretical framework of Technology Acceptance Theory and Social Capital Theory. Chief Nursing Officers who were members of the Kansas Hospital Association were surveyed with a 48.8 % return. The results of the study revealed the Chief Nursing Officers were deeply aware of the importance of the electronic health record for promoting best possible outcomes for patients and for improving the delivery of quality nursing care. Social capital was not significantly correlated with the implementation of the electronic health record ($r = -.013, p = .936$). The study also revealed that for this population of Chief Nursing Officers, they felt powerful in their profession, felt the use of the electronic health record was important to provide safe, quality care to their patients and were active in their hospital's electronic health record implementation team. The Institute of Medicine challenged healthcare providers to transform the health care system in the United States into one that is fair, equitable, efficient, safe, and provides quality patient care, the results from this study may be a step towards that goal.

Key words: electronic health record, functionalities, technology acceptance theory, social network theory, social capital, social capital theory.

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Chapter 1: General Introduction

Introduction

The United States spends more on health care per capita than any other industrialized country. In 2005, the total expenditure was 15% of the Gross Domestic Product (GDP) and continues to rise (Centers for Disease Control, 2007; Congressional Budget Office, 2007). Furthermore, the United States spends more than twice per capita on health care than its closest competitor, yet paradoxically ranks the lowest or least equitable with regard to financial contributions to health systems (Murray & Frenk, 2010; The Commonwealth Fund Commission, 2006, 2008; The U.S. Health Care System, 2001). The World Health Organization (WHO) ranks the United States health care system's performance as 37th among the 191 countries analyzed, ranking the United States between Costa Rica and Slovenia (World Health Organization, 2000). The Commonwealth Fund Commission (2006) reported the United States falls far short on all major dimensions benchmarking top health care performance and has not improved by the publication of the Commission's 2008 report. The Commission's current report ranks the United States last among the 19 countries analyzed with regard to the measure of mortality amenable to medical care. In addition, WHO reported the United States is the only developed country besides South Africa, which does not offer universal health care coverage for its citizens. The myth that the United States health care system is the best in the world is an assertion that the public may no longer be able to believe (Schuster et al., 1998; The U.S. Health Care System, 2001; World Health Organization, 2000).

In 1998, the Institute of Medicine (IOM) initiated a series of reports in response to documentation by The Rand Corporation (Schuster et al., 1998) and the National

Roundtable on Health Care Quality (Chassen et al., 1998) that revealed the serious and “pervasive overuse, under use, and misuse” of medical treatment (Institute of Medicine, 2001a, p. 2). Two initial reports by the IOM revealed alarming statistics concerning the status of medical care and its delivery in the United States. *To Err is Human* (2000) catalogued the frequency of medical error while encouraging health care professionals to find better alternatives to improve health care delivery. *Crossing the Quality Chasm* (2001) identified the crucial role of information technology (IT) in health care and provided a prescription for health care providers to improve care delivery making it “safe, effective, patient-centered, timely, efficient, and equitable” (p. 5-6).

In order to achieve these goals, the IOM’s Committee on Quality Health Care in America recommended IT play a central role in assuring quality and safety. Subsequently a third report, *Health Professions Education* (2003), recommended “all health professionals should be educated to deliver patient centered care as members of a multi-disciplinary team, emphasizing evidence-based practice, quality improvement approaches, and informatics” (p. 3). Together these reports offer a comprehensive strategy to improve the safety of the health care system and provide performance expectations for the twenty-first century. A fourth report, *Keeping Patients Safe* (Page, 2004) identified solutions to problems that threaten the safety of patients in healthcare organizations relating to nurses’ work environment, work design, and organizational policy issues. This report stressed the creation of a culture of safety through transformational education, leadership, and management practices.

To move this strategy forward the committee recommended the development of an electronic health record using standardized interoperable information technology that

could build a national health information infrastructure (Richardson & Corrigan, 2002). In response to these reports, President Bush twice addressed the nation regarding the seriousness of medical errors (December, 1999), and in the State of the Union address, January 20, 2004, proposed the National Coordinator of Health Information Technology (ONC) develop a plan to improve health care quality using information technology. Recently President Obama has called for the implementation of a nationwide electronic record within five years (January, 2009).

The National Committee on Vital and Health Statistics (NCVHS), the statutory federal advisory committee to the Department of Health and Human Services, proposed a National Health Information Infrastructure (NHII) in 2001. Not a national database, the NHII offers a strategy by which information can converge with security and privacy (Stead, Kelly, & Kolodner, 2005). The NHII includes electronic health record systems for all providers as well as the ability to share information in real time easily and efficiently to ensure all information is present for decision-making at the time of treatment (Yasnoff et al., 2004). Development and implementation of the electronic health record (EHR) was conceived as involving local and community information sharing networks. Regional Health Information Organizations (RHIOs) would serve as the building blocks for a national information-sharing network (Brailer, 2005). These local networks would be set in place and their functionality determined by the health care providers who use them. Together health care providers and software designers would develop products that meet the specific needs for implementation of computerized provider order entry (CPOE), clinical documentation, decision support, and administrative functions, that are secure, accurate, fiscally sound, and efficient.

Health Care Informatics

To use information technology to its fullest capacity, the discipline of health care informatics emerged (Coiera, 2003; Englebardt & Nelson, 2002; Hersh, 2006; Sackett & Erdley, 2002). Health care informatics is defined as the study of information and communication systems in health care that support the practice of health care delivery to all healthcare patients and providers (Coiera; Englebardt & Nelson; Thede, 2003). It involves understanding and describing the principles that shape information and communication. Health care informatics strives to develop interventions, methods and principles to design and improve information systems while evaluating the impact of the interventions on individual and organizational outcomes (Coiera). Health care providers, across multiple disciplines, who have educational and experiential backgrounds in information technology and/or clinical practices who interact with the technology provided by their workplace to deliver the safest, quality care to their patients, can be considered health care informaticians.

Nursing Informatics

Traditionally nursing has avoided computer technology use, in part, fearing lack of knowledge or fearing having their expertise replaced by a computer (Simpson, 2004). Patterson et al. (1995) reported although one half of the nurses surveyed thought computers would improve the continuity of care only 10% preferred the computer over traditional methods of pen and paper documentation. Lee (2004) concluded nursing has not traditionally been concerned with applying advanced information technology to patient care nor did nurses want to think critically regarding charting changes in patients

conditions using documentation software. However as computers have become readily available for home use, and increasingly user-friendly, this fear among nurses has subsided (Alpay & Russel 2002; Dillon, McDowell, Salimian, & Conklin, 1998; Kirkley & Stein, 2004). Currently, nurses have little resistance to technology but fear time spent performing one more task will take time away from their patients (Ammenworth, Mansmann, Iller, & Eichstadter, 2003; Simpson).

Nursing provides and integrates patient treatment at the point of care. As a generator and integrator of information (Staggers & Thompson, 2002), nursing is in a distinct position to use technology to improve patient safety and provide quality care (Page, 2004). Nursing as the nation's largest health care profession (American Nurses Association, 2008), functions as the healthcare professionals who are most often present at the bedside. However providing health care through the utilization of technology is not the sole domain of the nurse, it involves multiple disciplines with heterogeneous skills. Physicians, pharmacists, social workers, as well as many other healthcare providers have access and add information to the health record. When nursing uses technology at the point of care not only can they provide a complete record of the care a patient receives, but they can bridge the gap between their patients and the presumably dehumanizing technology.

Nursing workflow must be accurately and fully represented in the electronic health record (EHR) in order for nurses to continue to deliver timely clinical data, gather relevant clinical evidence, provide critical links in the coordination of patient care, and integrate multiple sources of information regarding the comprehensive daily management of patient care (Courtney, Demiris, & Alexander, 2005). Computerized nursing

documentation allows nurses to track the care of the patient in progress and provide improved safety and care delivery through decision support mechanisms and alerts systems that can be available to multiple disciplines. Documentation in the EHR also affords nursing the ability to demonstrate and quantify their value in regard to the overall health and well being of patients and families (Health Information Management Systems Society, 2007).

Barriers to Nurses' Acceptance to Computer Technology

What are the barriers to nurses' acceptance and utilization of HIT in patient care? Impediments may be the perception of interference with clinical workflow, poor technical support, problems encountered during implementation, and lack of attention to people-related and organizational issues (Dillon, Blankenship & Crews, 2005). Dixon (1999) contended there are four categories of concern when implementing a new system; staff preparation and training, process changes, continuity of care, and HIT administration support. These issues must involve and be addressed with the end user, the nurse, during the process of implementation. On a daily basis nurses are confronted with, and resolve issues regarding patient safety and satisfaction, patient access to services, quality clinical outcomes, and inequality in health care (Abood, 2007). In order to ensure quality patient outcomes within the healthcare system nursing must be intimately involved in creating, changing, and implementing policies at the point of care and within the system's organization. Nurses are aware of the care they provide but in order to measure it, study it, and quantify its contribution, a common language must be developed and used so value can be reflected and documented, becoming visible (Saba & Taylor, 2008).

Technology is changing the environment for health care professionals. Nurses must have knowledge of advances in communication, newly developed drug treatments, advanced procedures and devices, and current knowledge of disease and disability. There is pressure now for the nurse to have the ability to work in ‘all worlds’, that is, to have clinical knowledge of patient care and the technical knowledge of computer and telecommunication, as well as the ability to demonstrate effectiveness in reducing costs and increase desired outcomes. Nurses must be effective at problem solving to reduce service gaps and errors as well as have the ability to promote and implement the use of new applications in the clinical environment (Dienemann & Van de Castle, 2003).

Marchibroda (2007a) contended achieving the goal of a national health information network relied on community-based health information exchanges to develop social capital that would reshape the design of health care institutions. Furthermore building social capital was imperative to the sustainability and success of any health information exchange. Social capital refers to the “resources individuals within a community draw upon to provide value to themselves and their organizations” (Lesser & Prusak, 1999, p. 1). These resources include trust, familiarity, shared identity, and a common language and context among individuals. This enables individuals to perform their jobs effectively and efficiently, in turn better enabling organizations to manage their knowledge resources (Cohen & Prusak, 2001). If nurses are to establish the value of their work through creating, and implementing health care information technology, they must become aware of their shared community and the utility social capital provides.

Incorporating all these tasks, the definition of nursing informatics would be the ability to “use technology to communicate, manage knowledge, mitigate error, and

support decision making” (Warren, 2006). Graves and Corcoran (1989) defined the nurse informatician’s role as the ability to “employ information theories, concepts, methods, and tools to analyze information and information system requirement; design, select, implement, and evaluate information systems, data structures, and decision support mechanisms that support patients, nurses, and their human computer interaction within health care contexts, and facilitate creation of new nursing knowledge” (p. 227).

Nurse informaticians may be project managers who work with patients and families to coordinate multiple services, implementing complex systems. Their job responsibilities may be health information system management, writing requests for proposals, return on investment strategies, developing educational programs, evaluating workflow processes, writing policies, and aiding in design and content. They may perform the function of liaison between nursing and HIT and interface with families using interdisciplinary resources or be Chief Nursing Officers who coordinate nursing and HIT within their specific institutions. (Health Information Management Systems Society, 2007).

Examining belief factors, antecedents, and moderators are tasks easily performed by a Nurse Informaticist (NI). Using the skills in observation, assessment, and evaluation the NI can affect positive change in the acceptance of IT. Nurse informaticists are poised to accept the challenge of developing and working within a system that meets and exceeds the standards of the IOM’s recommendations for a safe, patient-centered, equitable, and efficient health care system.

Purpose

The purpose of this study is to investigate the electronic health record functionalities of acute care hospitals in the State of Kansas with regard to nursing practice. From the perspective of the Chief Nursing Officer, what is the nurses' role in implementation of the EHR, what nursing documentation is in the EHR, and what factors led to the acceptance of the EHR by the nursing staff.

Research Questions

The following research questions guide this descriptive study.

1. How many hospitals in the State of Kansas have implemented or are in the process of implementing an EHR?
2. From the perspective of the Chief Nursing Officer, if the EHR has been successfully implemented,
 - a) How does the EHR support nursing practice?
 - b) What are the nurses' roles in the implementation of the EHR?
 - c) What were the factors of their EHR implementation process that led to acceptance by the nursing staff?
 - d) What information do nurses document about the patient to the EHR?
3. What is the relationship between perceived social capital and the implementation of the EHR?

These research questions can reveal information that could be linked to create a coherent body of knowledge that would be pragmatically useful to practitioners, empirically useful to researchers, and critically useful for policy makers. Gathering existing knowledge and "linking the findings into a coherent structure" (Polit & Hungler,

1995, p. 111) coupled with access to new findings should enable new patterns to emerge about nursing behaviors in the EHR (Polit & Hungler). Furthermore, as health information exchange evolves in Kansas, knowledge of nursing's participation is critical to document nurses' contribution to patient care and its outcomes.

Assumptions

The paradigm of thought that underlines this study is expressed in the following assumptions. The hospitals in the State of Kansas must maintain patient records to facilitate clinical decision making and document care. The Chief Nursing Officer is responsible for development, implementation, and evaluation of the patient record that concerns nursing practice. Nurses having knowledge of the nursing role in this process warrants exploration as the EHR is developed and implemented to replace paper records. The nursing component then affects the quality of patient care increasing the nurses' ability to provide safe, efficient, timely care as well as affording the nurse the capability of securely gathering confidential patient data in order to explore practice that is evidence-based. Examining relationships that imply cause and effect is congruent with post positivist thought. Creswell (2004) stated postpositivism "reflects a deterministic philosophy in which causes probably determine effects and outcomes...and a need to examine causes that influence outcomes" (p. 7).

Conceptual Framework

This investigation is guided by the framework captured in the inter-relationship of the following concepts: social network, social capital, and the concepts of the technology acceptance theory: perceived use, perceived ease of use, and behavioral intention to use. These concepts are central to the foundation for this study and offer a structure with

which to understand the nurses' role in affecting EHR implementation. Chapter Two will further explicate these definitions and interrelationships.

Definition of terms

Health Information Technology (HIT) uses information systems via the computer and other wireless systems to transmit, store, and share health information concerning all aspects of patient care.

The National Health Information Infrastructure (NHII) proposed by the National Committee for Vital and Health Statistics (NCVHS) under federal mandate by the Department of Health and Human Services serves to improve the effectiveness, efficiency, and overall quality of health and healthcare in the United States. (National Health Information Infrastructure, n.d.; Yasnoff, 2004).

Nationwide Health Information Network (NHIN). Successor to the NHII, the NHIN provides a critical portion of the HIT agenda and would offer a secure, nationwide, interoperable health information infrastructure connecting providers, healthcare support personnel, and consumers. Information provided by the NHIN would provide clinical decision support to providers not only at point of care but beyond direct patient connection improving health and healthcare services (U. S. Department of Health and Human Services, 2007).

Electronic medical record (EMR) is a digital repository for clinical data, which provides clinical decision support, order entry, computerized provider order entry, across a multidisciplinary workforce. The EMR supports the patient's medical record across inpatient and outpatient environments, and is used by practitioners to document, monitor, and manage health care delivery within a care delivery organization (CDO). The data in

the EMR is the legal record of the patient's treatment course during their encounter at the CDO and is owned by the CDO (Health Information Management Systems Society, 2007).

Electronic health record (EHR) refers to an individual patient's health record in digital format. Electronic health record systems co-ordinate the storage and retrieval of individual records with the aid of computers. The EHR is owned by the patient. EHRs are usually accessed on a computer, often over a network. It may contain electronic medical records (EMRs) from many locations and/or sources. A variety of types of health care-related information may be stored and accessed in this way (Aspden, Corrigan, Wolcott, & Erickson, 2004).

Electronic health record functionalities. The eight core functions are health information and data, result management, order management, decision support, electronic communication and connectivity, patient support, administrative processes and reporting, and reporting on population health (Institute of Medicine, 2003).

The Technology Acceptance Theory is an information systems theory that models (using the Technology Acceptance Model, TAM) how users come to accept and use a technology. TAM suggests that when users are presented with new technology, a number of factors influence their decision about how and when they will use it, notably: perceived usefulness, perceived ease of use, and behavioral intention (Davis, 1989).

Regional Health Information Organizations (RHIOs) are collaborative multi-stakeholder organizations that provide leadership, fiduciary responsibility, and governance of e-health initiatives in local regions and are to be the building blocks of the national information sharing network (Brailer, 2005).

Chief Nursing Officer (CNO): The nurse executive who makes decision in the medical facility or hospital regarding how nursing is practiced.

Social Network: A social structure made up of individuals or organizations tied by one or more specific types of interdependencies such as values, visions, kinship, friends. Social networks can be used to determine social capital of individual actors (Lin, 1999).

Social capital: The degree to which a community collaborates and cooperates through such mechanisms as networks, shared trust, norms, and values to achieve mutual benefits and enabling the accomplishment of social and economic goals (Cohen & Prusak, 2001; Coleman, 1988; Lin, 2005). “Social capital is the collection of resources owned by the members of an individual’s personal social network, which may become available to the individual as a result of the history of these relationships” (van der Gaag, 2005, p. 20).

Delimitations

This study will be confined to hospitals, excluding psychiatric hospitals, in the State of Kansas. Those surveyed will be the Chief Nursing Officers.

Limitations

The study’s participants will not be chosen in a random manner therefore the results will be limited and not allow the researcher to predict how other nurses may react in implementing information technology solutions nor can they be generalized to other hospital environments. Using a quantitative method of analysis may not acquire the depth of meaning that a qualitative study may provide.

Summary

The myth that the United States has the best health care in the world is just that. The health care system in the United States is in crisis. Contrary to public opinion, the

United States is not the provider of the best or most equitable health care (Centers for Disease Control, 2007; The Commonwealth Fund Commission, 2006, 2008; World Health Organization, 2000). Health care quality, cost, and access are concerns for every health care provider. The IOM has issued a series of reports defining the quality of care as safe, effective, timely, patient centered, effective, and equitable (Institute of Medicine, 2001a; Kohn, Corrigan, & Donaldson, 2000). They, in turn, have offered solutions to alleviate this crisis and achieve this goal of quality of care for all. The IOM has recommended information technology play a central part in the redesign of the health care system and emphasized nursing's role in keeping patients safe (Greiner & Knebel, 2003; Page, 2004).

The use of HIT has as its goal the improvement of health care, health care delivery and health care quality. Proponents anticipate with the increased use of HIT, health care will improve in safety and accuracy, become more efficient, timely, equitable, and improve the security and confidentiality of patient records. In order to achieve this goal, use of information technology must become a fluid experience. The technology acceptance theory assumes when one forms an intention to act, they will be free to act without limitation. In practice however, there are multiple factors that mediate technology acceptance-time, ability, environmental or organizational limits, and unconscious habits, all limit freedom to act (Davis, 1989). It is critical to determine how and why we use HIT in order to derive the benefits of HIT.

Nursing informatics is a subspecialty of a new discipline within the health care field of health care informatics. It is, in part, a combination of the practice of information science, computer science, and communication science practiced within the health care

arena (Staggers &Thompson, 2002). Nurses, as the largest organized professional health care providers in the United States, (American Nurses Association, 2008) have a unique opportunity to play a crucial role in creating a safe, effective health care environment that uses multiple systems as well as HIT if given the opportunity.

Chapter 2: Review of Literature

Reports published by the Institute of Medicine (IOM) argue the United States health care system needs fundamental change (Aspden, Corrigan, Wolcott, & Erickson, 2004; Greiner & Knebel, 2003; Kohn, Corrigan, & Donaldson, 2000; Institute of Medicine, 2001a; Institute of Medicine 2001b; Page, 2004). The IOM reports reveal a dangerous, fragmented, inefficient, costly, and burdensome health care system. The gravity of the problem is reflected in the following specifics documented by the IOM. 1) more patients die from medical error than die from breast cancer, AIDS, and motor vehicle accidents combined; 2) medication-related errors cost hospitalized patients \$2 billion per year; 3) patients receive appropriate care only 50% of the time; 4) frequently tests must be duplicated due to the results of previous tests being unavailable; and 5) Americans spend approximately \$500 billion in unnecessary medical costs (Kohn, Corrigan & Donaldson; Institute of Medicine, 2000). This inefficient system provides poor quality health care to Americans and costs approximately \$1.7 trillion per year (Rand Corporation, 2005). The Commonwealth Fund Commission (2008) projects this number to double to \$4 trillion over the next decade if there are no changes made to the current health care system. In 1996, the IOM launched a Quality Initiative Series focusing on assessing and improving the nation's health care. The first phase reports documented an error-ridden, seriously fragmented healthcare system that provides poor quality health care to citizens through overuse, misuse, and under-use of healthcare services. The second phase began with the reports, *To Err Is Human: Building a Better Health System* (2000) and *Crossing the Quality Chasm: A New Health System for the 21st Century* (2001). In this Quality Initiative Series, *To Err Is Human* brought the public's

attention to the magnitude of errors being committed in health care institutions and asserted that error blame should not be ascribed to misconduct or negligence by individuals but to a system needing profound improvement in delivering care. *To Err* focused on error management, suggested a systems approach to error reduction, and called for the creation of a culture of safety; a culture that consists of trust and knowledge-sharing from all levels of health care providers at all levels of care processes (Institute of Medicine, 2009). The IOM advocated for better design of work processes to improve patient and provider safety, and for an increase in understanding of the use of information technology (IT) in the mitigation of error. The IOM recommended reporting systems that were voluntary, confidential, nonpunitive, and cited the need for a combination of federal legislation and internal protection to extend peer review protections to data collected and analyzed. Nursing has long been a force behind this call for quality, safe health care that is evidence-based, although this is not mentioned by the IOM's *To Err* report. Nightingale (1860) raised these issues stating hospitals may benefit only the majority causing the remaining patients suffering. She further contended that a great deal of suffering and mortality could be avoided and pondered whether the patient's diseases might not have been acquired while being hospitalized. Wakefield (2008) stated Nightingale contemplated measurement, developing evidence, public reporting, and linking payment with quantifiable performance and contended these were goals that nursing should strive toward.

Following *To Err* (2000), the IOM published several reports which characterized the healthcare system as fundamentally broken. These reports created a vision for how the United States healthcare system can be reformed and brought an acute public

awareness regarding the quality, safety, and utilization of services in the United States healthcare system. In *Crossing the Quality Chasm* (2001) the IOM proposed care should be evidence-based and systems oriented. The focus of care for nurses and clinicians should be to provide safe, effective, patient-centered, efficient, timely, equitable care, supported by the use of IT. The IOM emphasized HIT has an enormous potential to improve the quality of care in the area of *safety* through automated order entry systems, in the area of *effectiveness* using automatic reminders for compliance with best practices, and to make practice more *patient-centered* by having up to date clinical knowledge available. *Timeliness* is supported through immediate availability of tests and diagnostic procedures, *efficiency* is improved by reducing redundant medical tests, and *equity* can be enhanced by providing a broader range of options for communication. Care practices must be continually and systematically evaluated by nurses and healthcare providers for the outcomes they provide in order to create best practices based on scientific principles.

The *Quality Chasm* (2001) report mapped out 10 new rules for the redesign of the healthcare system. See Table 1 for these rules. Wakefield (2008) stated these rules have particular import for nursing practice, education, and research and among these ten; three had particular relevance with regard to nursing. First, care should be based on a continuous healing relationship, not fragmented but coordinated among clinicians. Knowledge should be shared and a free flow of information should pass between all healthcare providers as well as to patients. Secondly, the patient should be the source of control and the primary decision-maker. Wakefield asserted nurses can lead efforts to make these rules actionable and can be key partners in leading this transformation in quality improvement to health care. Finally, cooperation among clinicians should be

emphasized. An atmosphere of cooperation, open communication, and trust among clinicians ensures quality care and safety improvements can proceed in the redesign of health care. Currently, there are nearly three million nurses practicing in the United States representing 55 % of all the health care workers (American Nurses Association, 2008, U.S. Department of Health and Human Services, 2004a). A group of this size should possess tremendous economic, social, and political power (Abood, 2007; Beall, 2007; Manojlovich, 2005).

Table 1.
Ten New Rules for the Redesign of the Healthcare System

Care is based on continuous healing relationships
The patient is the source of control
Care is customized to patient needs and values
Shared knowledge and free flow of information
Evidence-based decision making
Safety as a system priority
The need for transparency
Anticipation of needs
Cooperation among clinicians
Continuous decrease of waste

The third phase of the Quality Initiative Series operationalized the vision for health system quality through the following reports: *Health Professions Education: A Bridge To Quality* (2003), *Patient Safety: Achieving a New Standard of Care* (2004), *Keeping Patients Safe: Transforming the Work Environment of Nurses* (2004), and *Key Capabilities of An Electronic Health Record* (2003). *Health Professions Education* envisioned, “All health professionals should be educated to deliver patient-centered care as members of an interdisciplinary team, emphasizing evidence-based practice, quality improvement approaches, and informatics” (p. 45). A set of five competencies

accompanied this vision, namely, health care providers work in interdisciplinary teams, provide patient-centered care, employ evidence-based practices, apply quality improvement, and use informatics.

This series of reports by the IOM offer features of reform combining three overlapping levels of systems—the environmental level, the health care organization level, and the level of interaction between healthcare provider and patient (Institute of Medicine, 2009). These four reports all strongly advocate the redesign of nursing work processes. The design, implementation, and use of HIT systems play a critical role in the culture of knowledge, safety, and job satisfaction in the nurses' work environment. Corroborating this information was the Aiken et al. (2002) landmark study that provided one of the first scientific reports correlating patient outcomes with nursing environments. Aiken's study results concluded in hospitals with high patient to nurse ratios, surgical patients had increased 30 day mortality rate, increased failure to rescue rate, with nurses experiencing greater burnout, and job dissatisfaction. Furthermore, evidence regarding nursing empowerment and patient safety outcomes in the workplace support Aiken's results (Laschinger & Leiter, 2006; Manojlovich, 2005).

Together, the reports from the IOM offered a prescription for change to policymakers and health care leaders that included redesigning the framework of the healthcare system and presented a visionary plan for its accomplishment. The implementation and utilization of health care information technology (HIT) was identified as an integral component for improvement (Greiner & Knebel, 2003; Page, 2004). Nursing, as an integral part of a multidisciplinary team, clearly has an essential

role in articulating the essential features the IOM has emphasized for a quality, high performing health care system.

The health care system has notably lagged behind other industries in its application of technology to system management and in the reduction of error (Kohn, Corrigan, & Donaldson, 2000). However technology, in and of itself, is not the panacea for all of the health care problems in the United States (Nadzam & Mackles, 2001; Page, 2004). Mason (2008) contended merely using technology alone does not create a safer system for patient care. Interdisciplinary communication among healthcare providers, decision-making using scientifically evidence-based practice, and creating a culture of safety is imperative if patients are to receive quality health care. This culture of safety called for by the IOM (Aspden, Corrigan, Wolcott, & Erickson, 2004; Kohn, Corrigan & Donaldson; Institute of Medicine 2001a, 2001b; Page), provides nursing with the opportunity to do what they have always done, that is, put patients first and lead the demand for changes in direct care, organizational structure, and interdisciplinary policy. Federal and local healthcare initiatives promoting change, require significant nursing contributions if their goals are to be met. Nursing empowers itself, as well as their patients, through the creation, direction, and application of public policy that directly influences how patient care is organized and delivered (Mason, 2008).

Nursing's contribution in the development of HIT through public policy revision promotes and ensures the culture of safety and quality care for all. Mitchell (2008) stated nursings' ability to coordinate and integrate multiple aspects of care makes it possible to fulfill the goals of these policies. Nursing is not only "grounded in application and service" (Rains & Barton-Kriese, 2001, p. 223) but can use skills of communication and

consensus building by intervening in the transformation of health care policy. Nursing can modify the direction of healthcare services by the development and enactment of political policy that supports a safe and equitable environment for healthcare providers and their patients. Nursing can use political activism to make an impact on organizational policy at the federal, state, and local levels (Reutter & Williamson, 2000). To fully comprehend how nursing can affect what the IOM calls a safe, efficient, timely, equitable, and patient-centered system, assisted by HIT, it is important to examine the initiatives at both the national and local levels.

Federal Initiatives for HIT

Needed reform of health care provision in the United States has reached a profound sense of urgency. President Bush has addressed the nation repeatedly concerning the status of healthcare safety and quality. In his 2004, State of the Union address, he urged providers to ensure quality of care for every American by 2014 by developing an interoperable, secure electronic health record (Bush, 2004). President Obama (2009) has continued this call for the transformation of health care to include information technology and paperless record keeping. To this end, multiple federal initiatives have been created. These federal initiatives provide the framework for nursing to apply leadership, guidance, and direction with regard to the implementation of EHR operability. Through these initiatives nursing can collaborate with multiple stakeholders to set goals, create standards, develop public policy, and identify areas of education needed to achieve the IOM's vision of bridging the "quality chasm".

In the 21st century, nurses must be knowledge workers with the complete picture of the patient's condition in order to make patient-centric decisions in mission-critical

environments with access to the right data at point of care (Stein & Deese, 2004). Each federal initiative provides nursing the opportunity, through data acquisition, to bring attention to and validate the importance of their contribution to healthcare.

Department of Health and Human Services (HHS)

The HHS is the principal United States government agency charged with protecting the health of all Americans as well as providing essential human services. The department includes approximately 300 programs covering a wide-range of social services. These include Medicare and Medicaid, Health Information Technology, assistance for low-income families and the elderly, *Headstart*, and emergency medical preparedness. The HHS funds multiple United States Health Service agencies namely, the National Institute of Health (NIH), the Food and Drug Administration (FDA), the Centers for Disease Control and Prevention (CDC), the Health Resources and Services Administration (HRSA), and the Agency for Healthcare Research and Quality (AHRQ). The HHS budget represents approximately one fourth of all federal dollars spent in the United States (U.S. Department of Health and Human Services, 2007). Mike Leavitt, when sworn in as the Secretary of the HHS stated “he is committed to unleashing the power of technology to improve the quality of care, reduce mistakes, and manage costs.” (Leavitt, 2005, ¶ 5). Secretary Leavitt stated, “the use of electronic health records, and of health information technology as a whole, has the ability to transform the way health care is delivered in our nation. We believe that EHRs can help physicians deliver better, more efficient care for their patients, in part by reducing medical errors.” (U. S. Department of Health and Human Services, 2008, ¶ 2). He further specified his principles that lead to better health care for Americans, which mirror those of the nursing profession: national

standards, neighborhood solutions, collaboration, not polarization, solutions transcend political boundaries, protect privacy, reward results not programs, change a heart change a nation, and value life (U.S. Department of Health and Human Services, 2007).

National Committee on Vital and Health Statistics (NCVHS)

The National Committee on Vital and Health Statistics is a statutory advisory committee and is the public advisory body to the Secretary of Health and Human Services. NCVHS is charged with providing the HHS with health data and statistics, advice and assistance and provides an environment for discussion among interested private sector groups on a variety of key health data issues. In addition, the NCVHS is responsible for the implementation of the Administrative Simplification provisions of the Health Insurance Portability and Accountability Act (HIPAA) of 1996.

The committee is comprised of experts from the private sector with expertise in health statistics, electronic health information exchange that includes the sharing of information privately and securely, population based public health, financing health care services, integrated computerized health information systems, health services research, epidemiology, consumer interests in health information, health data standards, and the provision of health services. The NCVHS has created subcommittees and workgroups to evaluate topics of concern relevant to health care and health care information policy. In 2001, the NCVHS advised the HHS to create the NHII. In 2004, Brailer, then the National Coordinator for Health Information Technology, developed a *Framework for Strategic Action* that identified a new vision of healthcare using a nationwide health information network. The identified action plan consisted of four sequential goals; informing clinicians, interconnecting clinicians, personalizing health, and population

health. In 2006, the NCVHS executive subcommittee developed 15 recommendations to Secretary Leavitt. Of these 15, 11 were functional requirements for a nationwide health information network (NHIN). See Table 2 for these functionalities. These recommendations included not only a statement of requirements, but recommendations to ensure complete and widespread applicability of the functional requirements providing a broad array of scenarios applicable to the development of a secure nationwide health information network.

Table 2.
Eleven Functional Requirements for a NHIN

Certification
Authentication
Authorization
Person Identification
Location of health information
Transport and content standards
Data transactions
Auditing and logging
Time sensitive data access
Communication
Data storage

American Health Information Community (AHIC)

The AHIC was formed in 2005 by Secretary Leavitt, as a federally chartered advisory committee to make recommendations to the HHS on the advancement of HIT to improve public health and patient safety while protecting the privacy and security of personal health information. Its goal is to accelerate the progress of Presidents Bush's goal of having an interoperable electronic health record by 2014. The committee consists of workgroups, open to feedback from the public, formed to address biosurveillance, consumer empowerment, chronic care, electronic health records, confidentiality, privacy

and security, quality, and personalized healthcare. One of primary purposes of AHIC is to generate use cases to be used in strategies by the ONC to promote HIT. The use case was created by the Office of the National Coordinator for Health Information Technology (ONC), in two stages: “the Prototype Use Case, which describes the flows of the use case at a high level and facilitates initial discussion with stakeholders; and the Detailed Use Case, which documents all of the events and actions within the use case at a detailed level” (U.S. Department of Health and Human Services, (2008b), ¶ 2). Use cases provide stakeholders with functional interoperability specifications so the vision of the NHIN can be realized. As use cases are applied to patient care and implemented with success providing safe, efficient, quality care, a relationship of trust is developed with the public. See Table 3 for these use cases. These use cases can build a sense of trust and security with the public, building social capital with regard to the public’s perception of the importance, ease of utility, and safety of use cases.

The Technology and Informatics Guiding Education Reform (TIGER) Initiative has participated in the harmonization of use cases. TIGER (2006) was created to seek out best practices in information and knowledge management and identify valuable technology capabilities for nurses. TIGER's goal is to develop and distribute best practice and action plans that can be disseminated within nursing and other healthcare provider educational settings (Dulong & Gassert, 2008). Harmonizing specifications is important because by creating a framework, or template, a solution can be identified for known problems relating to a use case. Specifications are intended to be used by architects and systems designers as a way to guide future implementation efforts based on HIT (Technology Informatics Guiding Education Reform).

Table 3.
Examples of Use Cases

2008	Remote Monitoring Patient - Provider Secure Messaging Personalized Healthcare Consultation and Transfers of Care Public Health Case Reporting Immunizations & Response Management
2007	Emergency Responder — Electronic Health Record Consumer Empowerment: Consumer Access to Clinical Information Medication Management Quality
2006	Harmonized Consumer Empowerment (Registration & Medication History) Harmonized Electronic Health Record (Laboratory Result Reporting) Harmonized Biosurveillance (Visit, Utilization, and Lab Result Data)

Office of the National Coordinator (ONC)

The Office of the National Coordinator for Health Information Technology (ONC) was created in 2004 to provide leadership in developing and implementing a nationwide interoperable health information technology infrastructure in both the private and public sectors. The coordinator provides counsel to the Secretary of Health and Human Services as well as providing management to the American Health Information Community (AHIC) and other committees as assigned. The coordinator organizes the HHS’ internal policies and programs regarding health information technology with other relevant branch agencies and develops, maintains, and directs the implementation of HHS’ strategic plan (Office of the National Coordinator, 2007).

The goals of ONC are twofold, that of patient-focused health care and population health. Recurring themes throughout these two goals are the objectives of collaborative

governance, interoperability, privacy and security, and adoption. Strategies to achieve these goals are characterized as involving multiple stakeholders across the public and private sectors; focusing on reliability, confidentiality, privacy, and security when exchanging storing, and using electronic health information; and identifying the consumer of health care as the most important participant. These goals, objectives and strategies must be achieved in a coordinated manner distributed across the federal government in partnership with federal agencies and other stakeholders. ONC will periodically update, plan, and actively engage federal agencies in re-evaluating the strategic objectives and strategies.

There are several strategies to achieve these goals, namely commitment of public and private stakeholders to the implementation of an interoperable health information architecture; consideration for reliability, confidentiality, privacy, and security with regard to the exchange, storage, and usage of electronic health information; and involving the consumer as a critical component in achieving the two overarching goals.

Coordinating these goals, objectives, and strategies must be achieved across the federal government in partnership with federal agencies and other stakeholders (Office of the National Coordinator, 2008).

Health Information Technology Standards Panel (HITSP)

HITSP was created by ONC as a public-private partnership to identify and harmonize data and technical standards for healthcare. HITSP works with standard development organizations (SDOs) to harmonize specific priorities advanced by AHIC and works to foster the availability and use of health information technology standards nationally. HITSP works within healthcare organizations to develop interoperability

specifications that provide technical details for how those standards are to be met and ensures that they are available for national use.

American National Standards Institute (ANSI)

American National Standards Institute (ANSI) is a not for profit organization. It has coordinated the U. S. voluntary standardization system since 1918. ANSI creates and publishes norms and guidelines to ensure the safety and health of consumers and the environment. ANSI also accredits programs that assess conformance to standards including (quality) ISO 9000 and (environmental) ISO 14000 (American National Standards Institute, 2008).

Certification Commission for Healthcare Information Technology (CCHIT)

The mission of the CCHIT is to accelerate the adoption of HIT by creating an efficient, credible, and sustainable certification program. The CCHIT is an independent, voluntary private-sector initiative that is a recognized certification body for EHRs and their networks. The CCHIT assists in the coordination of volunteer development efforts, communication and outreach, and the administration of certification testing (Certification Commission for Healthcare Information Technology, 2008).

Nationwide Health Information Network (NHIN)

The goals of the NHIN are to secure a nationwide interoperable health information infrastructure connecting all providers and consumers in support of health and healthcare. The NHIN will allow clinical decision support for providers and allow information to follow the consumer, all in support of the appropriate use of healthcare information to improve health. To achieve these goals the NHIN will develop capabilities for standards-based data exchange, ensuring appropriate information is available securely

and confidentially at the time and place of care; improve the coordination on patient information among healthcare providers; give consumers new capabilities for managing and controlling their personal health records as well as providing access to their health information from EHRs and other sources; reduce risk from medical error and support the delivery of evidence-based medical care; lower healthcare costs from inefficiencies due to errors, incomplete information or duplicate testing; and promote increased choice through accessibility of accurate information on healthcare costs, quality, and outcomes.

The ONC stated the NHIN will be created from state and regional health information exchanges (HIEs) to exchange healthcare information and will be a ‘network of networks.’ The AHIC has recommended three priority use cases for the NHIN: consumer empowerment, the EHR, and biosurveillance (Office of the National Coordinator, 2007).

Health Information Security and Privacy Collaboration (HISPC)

HISPC is a partnership of multidisciplinary experts in privacy, security, and health care management as well as members of the National Governors Association. Each State, using this broad range of stakeholders, is charged to develop comprehensive information exchange solutions so privacy and security may be ensured, quality improvement achieved, medical error reduced, accurate research conducted, best practices identified, and efficiency and affordability of health care improved. States are charged to work closely with other state governing bodies to exchange information and experiences regarding HIE challenges and barriers and to provide implementation solutions applicable at the state and federal level (Health Information Security and Privacy Collaboration, 2007).

State Initiatives for HIT

Kansas is a member of the Health Information Security and Privacy Collaboration (HISPC) funded by ONC and AHRQ. The goals of HISPC are to identify state law and business policies that impact health information exchanges (HIE) and to encourage each State to develop an implementation plan to promote the development of HIE. These HISPC goals include incorporating the needs of the health care consumer and promoting trust in the new health information-sharing environment. Achieving these goals is an important part of the federal effort to develop the Nationwide Health Information Network (NHIN).

Kansas Health Care Cost Containment Commission (H4C)

In response to President Bush's address of April 2004, Governor Sebelius issued executive order 07-02 that created the H4C. H4C seeks to identify long term HIT/HIE strategies to improve the quality, safety, and efficiency in Kansas' health care system. The H4C commissioned the Kansas Statewide HIE/HIT Policy Initiative to develop infrastructure recommendations to support HIE in Kansas. See Table 4 for these strategies. Governor Sebelius stated it is recognized "that the early adoption of a statewide information infrastructure would improve health care quality, safety and efficiency by ensuring health information is available to health care providers at the point of care for all patients, reducing medical errors and avoiding duplicative procedures, improving coordination of care between hospitals physicians and other healthcare professionals, and providing consumers with access to quality and cost information as well as their own health information to encourage greater participation in their own healthcare decision" (Executive Order 07-02, 2007, ¶ 2).

Table 4.
Strategies for H4C

The Commission	Shall make recommendations on solutions to reduce health care administrative processes that increase costs without improving patient care.
The Commission	Shall advise and support the Governor and her staff as they develop and implement strategies for more efficient and effective uses of health related information.
The Commission	Shall identify obstacles to revamping Kansas' health system infrastructure and provide recommendations to remove or minimize those obstacles.
The Commission	Shall assist the Governor in ensuring that the strategy and plan preserve the privacy and security of health information, as required by state and federal law. The Governor shall provide staff support to the Commission and may enter into contracts as necessary or proper to carry out the provisions and purposes of this order. In addition, all agencies under the control of the Governor are directed, and all other agencies are requested, to render full assistance and cooperation to the Commission.

Kansas Health Information Exchange/Health Information Technology Policy Initiative

In February 2007, Governor Sebelius stated there is an opportunity, through the expanded the use of information technology, to lower health costs, improve health care quality and reduce medical errors. The governor announced an initiative that would further the work of the Governor’s Health Care Cost Containment Commission (H4C). This initiative, the Health Information Exchange (HIE) Commission, is charged with using HIT to achieve health care cost effectiveness and quality and brings together providers, stakeholders, and representatives of the community including; business members, health care policy experts, information technology experts, and consumers. The

Governor stated the HIE Commission goals are in part to promote the public good by insuring equitable and ethical approaches to HIE for the improvement of health care, facilitate a standardized approach to interoperable HIE, advance HIE while protecting the privacy and security of the public's health information, and to leverage existing HIE initiatives and proactively seek opportunities to use HIE for the betterment of Kansas' health care system. This group of providers and stakeholders will collaborate through HIE workgroups to seek new opportunities to expand and implement recommendations previously suggested by the H4C. These recommendations include standardizing credentialing for physicians seeking to join health plan and hospital networks, developing HIT projects, and researching innovative ways to promote the safe and secure electronic exchange of health information. The approach used will include the public and private community, to develop ways HIT can ensure patients are afforded safe and secure quality care (Kansas Health Information Exchange/Health Information Technology Initiative, 2007).

Kansas Health Policy Authority (KHPA)

The Kansas Health Policy Authority (KHPA) was created on July 1, 2005 by the Kansas legislature. It is responsible for coordinating a statewide health policy agenda incorporating effective purchasing and administration with health promotion strategies. In 2008, Governor Sebelius recommended the KHPA receive the proposals of the Kansas HIE/HIT Commission and become the coordinating entity for the implementation of its recommendations. The next step toward implementation of the HIE/HIT Commission would be to establish a "resource center" to serve the state and regionally funded pilot

projects, collecting and analyzing pertinent data, and evaluating project impact where applicable (H. Connors, personal communication, May 28, 2008).

Kansas E-health Advisory Council

The Office of the Governor and the KHPA Board recently created the E-Health Advisory Council. This Advisory Council will act in an advisory capacity to the Governor and the KHPA. Its task is to promote the use of HIT in the development of a state-wide community healthcare record using the states purchasing power, to provide guidance for a state-wide education plan to coordinate government, public, and private stakeholders in the importance of HIT/HIE in improving overall population health, to provide guidance and strategies regarding policy issues related to HIT, and to assist in the development of a Resource Center for educational purposes with regard to stakeholders (Charter Statement, n. d.).

EHRs as HIT Implementation

The capabilities of information technology systems to store data have risen rapidly and exponentially. With all this data available at any time and virtually any place, being able to absorb or recall even a fraction of the data available is beyond human cognition (Yasnoff, 2004). Information technology solutions have been successfully applied in aviation, banking, and education but only recently has IT been recognized as a solution in healthcare. Brailer (2005) stated the treatment choices of healthcare professionals and consumers are supported by IT, enabling better and more cost effective care. Furthermore, when health IT is used it saves lives by supporting better treatment decisions and safer care practices for health care providers.

HIT is a complex and multifaceted strategic healthcare tool. Health information technology is comprised of a variety of integrated data sources using information technology that provides for all aspects of patient care. HIT can be used for storage of data and information, transfer of knowledge, decision support, error alert, and for building a broad library of evidence-based practice. Designing health care systems that use HIT could play central roles in preventing medical error and promoting quality and efficiency. The Rand Corporation (2005) estimated widespread adoption of HIT by hospitals, physician's offices, and long-term care facilities could save \$77 billion annually resulting in decreased hospital length of stay, decreased nursing administration time, more efficient drug utilization, and significantly improved health care quality.

HIT assists health care providers in multiple ways. It can provide clinical support; computer-based reminder systems to promote adherence to care protocols; computer assisted diagnosis and management programs to improve decision making at the point of care; immediate access to clinical information, and a means by which to incorporate and connect clinical research with patient care practices; and the ability to identify risk factors as well as making recommendations for preventative services (Brailer, 2005).

The greatest promise of achieving the best outcomes for health care are the carefully designed evidence-based care processes supported by electronic clinical information and decision support systems (Institute of Medicine, 2001a). To meet the challenges of efficiency and quality the results of therapeutic measures and outcomes from procedures or diagnoses must be documented, communicated, and evaluated. Common frameworks of cooperative health information systems must be implemented that support uniform standards, common performance rubrics, with interoperable models,

methods, and tools using a standard vocabulary (Blobel, 2004; Brailer, 2004; Rand Corporation, 2005; Westra, 2005). Yasnoff et al. (2004) established a consensus of guidelines and principles which together forms the vision of the National Health Information Infrastructure (NHII) and includes the capabilities of HIT to deliver “complete medical information immediately for patient care when and where needed, including both patient specific information and relevant decision support based on the latest scientific guidelines.” (p. 333). Furthermore, the NHII would allow health professionals to apply clinical judgment based on scientifically generated, evidence-based practice rather than forcing clinicians to make judgments based on potentially faulty memorized information. Creating an NHII would provide connectivity among healthcare providers allowing immediate access to information, data, and offering the ability to manage knowledge that would provide safe, timely, efficient, quality care to every patient. Yasnoff et al. proposed ten architectural principles for the local health information infrastructures (LHIIs) to use as building blocks for the NHII. These principles were meant to guide and encourage models local communities could use when developing and implementing interoperable HIT.

The IOM (1991) termed the computer-based record of patient care an Electronic Health Record (EHR) and stated it is technology essential for patient care. Electronic Health Records (EHRs) are evolving from documentation systems into tools health care providers can use to track, and delegate care. Because of the massive amounts of data available and generated everyday in biomedicine, effective understanding by any one person is not possible. The EHR offers a fast and easy resource for the retrieval of up-to-date research and practice guidelines (Yasnoff, 2004). The benefits for patients and

health care providers from the eight core functions of the EHR are fewer medical errors and adverse drug related events, fewer duplicate tests and procedures performed, a complete and accurate health history recorded and available, faster diagnosing capabilities based on comprehensive evidence-based practice guidelines, timely provision of health screenings and preventative care services, enhanced communication between providers and between provider and patient, and shorter wait time for physicians and patients improving the cost efficiency of the overall healthcare system, in short, safe, quality care (Institute of Medicine, 2003).

Informatics

Informatics is a comparatively recent discipline that has found its place in the health care industry. Nurses with this expertise are in demand. Warren (2006) has defined informatics as using technology to communicate, manage knowledge, mitigate error, and support decision-making. Just how nursing informatics should be defined has been debated throughout the past decade. Stagers and Thompson (2002) stated there is a need to succinctly define nursing informatics and this is a fundamental element for shaping a discipline, guides role delineation and provides direction for practice, education, training, and research. Early definitions of nursing informatics dealt with applying computer technology to all fields of nursing, designing nursing systems, developing patient-care decision making processes, nurse education and nursing research (Saba, 2001; Stagers & Thompson, 2002). This definition evolved into an information technology focus:

The HIT oriented view of nursing informatics is critiqued for overstating the role of technology and underemphasizing the need for the informatics nurse specialist to support the cognitive interaction between nurse, the nursing process, nursing data, patients and technology. . .informatics does not require the aid of a computer or other technology...e.g. [*nurse informaticists*] reorganize data

presentation in a paper document to increase its information content, developing taxonomies to increase data sharing across sites, and conducting research related to the nursing minimum data set. . .(this does not easily suggest) what role one might assume in health care organizations. . . specifically developing informatics theories, principles, methods, and tools. These activities of the nurse informaticist include needs analysis, requirements determination, structured system analysis design, selection, implementation and evaluation (Imhoff, Webb, & Goldschmidt, 2001, p. 183).

Staggers and Thompson (2002) offered a formal specification of the role of the informatics nurse:

To employ informatics theories, concepts, methods and tools to analyze information and information system requirements; design, select, implement, and evaluate information systems, data structures, and decision support mechanisms that support patients, nurses, and their human-computer interactions within health care contexts; and to facilitate the creation of nursing knowledge (p. 260).

The American Nurses Association (2008) definition is:

A specialty that integrates nursing science, computer science, and information science to manage and communicate data, information and knowledge, and wisdom in nursing practice. Facilitates the integration of data, information and knowledge to support patients, nurses and other providers in their decision-making in all roles and settings. Accomplished through the use of information structures, information processes, and information technology (p. 65).

The Technology Acceptance Theory

One component of the theoretical framework that underlies this study is the Technology Acceptance theory. Understanding how users come to accept and use a technology is vital to implementation of information systems (IS). Designers of IS are seeking methods for assessing the acceptability of a system as early as possible when designing and implementing a system. Being able to predict how users will respond,

whether they will resist or reject can allow the system developer to affect changes in the systems before it is implemented (Davis, Bagozzi, & Warshaw, 1989).

Davis (1989) asserted usage behavior is a direct function of behavioral intention. Behavioral intention is a function of reflected feelings towards the attitude of favorable or unfavorable viewpoint when using technology and whether or not technology can enhance the user's performance. Davis noted usefulness was statistically significantly more strongly linked to usage than was ease of use. He asserted this made sense conceptually: "users are driven to adopt an application primarily because of the functions it performs for them and secondarily for how easy or hard it is to get the system to perform those functions. . . users are often willing to cope with some difficulty of use in a system that provides critical needed functionality. . . no amount of ease of use can compensate for a system that does not perform a useful function" (p. 333). Davis developed and validated two new scales for the variables of perceived ease of use and perceived usefulness and hypothesized that these are fundamental determinants of user acceptance of technology. See Figure 1 for the diagram of Davis' Technology Acceptance Model based on his theory.

The goal of the Technology Acceptance Model (TAM) is to "provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (p. 985). TAM was designed using multiple theoretical constructs, described in Ajzen and Fishbein's Theory of Reasoned Action (1980) and Bandura's Self-Efficacy Theory (1986). Ajzen and Fishbein's theory addressed subjective norm or the degree to

which an individual believes people who are important to them think they should perform the behavior in question. Bandura's Self-Efficacy theory stated judgments of how well one can execute courses of action required to deal with prospective situations was a proximal determinant of behavior. Davis used these constructs to extrapolate that IT usage may be mediated by perceived usefulness and perceived ease of use mediated by behavioral intention or what does a person intend to do? He defined "perceived usefulness" as how much the user would believe IT would improve their job performance and "perceived ease of use" as how much the user believes any innovation would be of little effort to use.

Multiple research studies support the robustness of Davis' TAM (Chismar & Wiley-Patton, 2002; Hendrickson, Massey, & Cronan, 1993; Karahanna, Straub, & Chervany, 1999; Segars & Grover, 1993; Szajna, 1994). However there have been several conceptual additions to the original concept. These include the mediators of gender, (Gefen & Straub, 1997), social influence, (Malhotra & Galletta, 1999), prior IT use, (Taylor & Todd, 1995), and gender combined with social influence, (Venkatesh & Morris, 2000). These studies have added to the strong validity and reliability of Davis' original TAM.

Venkatesh, Morris, Davis, and Davis (2003) developed a unified model of the TAM using the eight models of the Theory of Reasoned Action, the Technology Acceptance Model, the Theory of Planned Behavior, a model of Personal Computer utilization, the Innovation Diffusion Theory, and the Social Cognitive Model. This unified model called the Unified Theory of Acceptance and Use of Technology (UTAUT) was formulated with four core determinants of intention and usage.

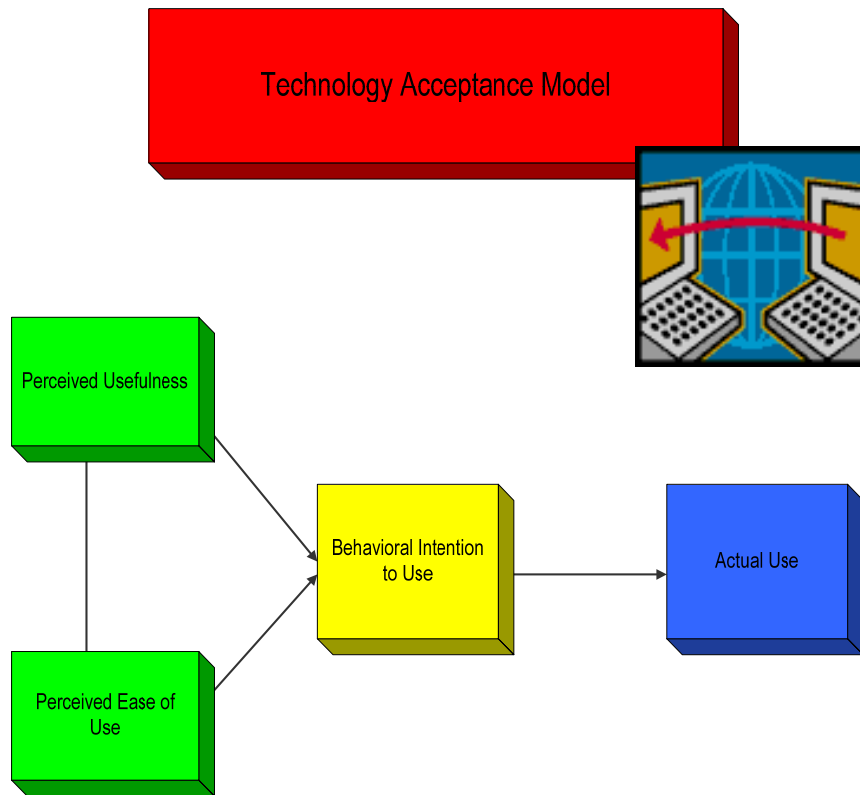


Figure 1. Technology Acceptance Model; Davis, 1989.

Venkatesh et al. concluded the UTAUT provided a useful tool for managers to determine if the introduction of new technology was successful and assists in understanding what determines acceptance in order to proactively design interventions in populations who may be less inclined to accept new systems.

TAM and Nursing Informatics

With the knowledge of the definitions of nursing informatics and the construct of TAM one can begin to address the implications of TAM for the nurse informaticist. The nurse informaticist possesses the skills of leadership, workflow process analysis, and evaluation to formulate and diagnose reasons for lack of acceptance. Tasks for the NI are

to create interventions, develop educational methodologies, and to control external factors in order to improve user acceptance. The NI can use TAM concepts when designing, implementing, and introducing new technological systems into a healthcare environment. It will be advantageous to the NI and the nursing staff to be cognizant of how and why staff interacts with new technology. Task characteristics and user personality alter the nature and importance of perception that explain technology use, both are used together or separately to develop assistance for user acceptance. HIT acceptance in a hospital environment is critical to support the new paradigm of patient care as recommended by President Bush, the IOM, and all who are involved in providing and receiving health care. The NI mobilizes the social networks such as mentors, colleagues, and esteemed professionals within the user's occupational environment and/or social worlds and uses this to influence work habits and acceptance of HIT systems (Karahanna, Straub, & Chervany, 1999).

The robustness of the TAM validates its use for personnel who design and implement an IT system. It provides a parsimonious tool to better predict, explain, and increase user acceptance and as such can be an important tool when introducing unfamiliar technology into a healthcare environment.

Social Networking, Social Capital, Nursing Workflow, and the Implementation of HIT

Marchibroda (2007b) urged the creation of a “secure electronic health information exchange” (§ 3) built from the ground up, supported by federal incentives and standards, and rewards the use of information technology (§ 3). She urged the formation of social and human capital, beginning at the local level, to create a community of good will, trust,

and reciprocity where collaboration would enable competitors and disparate stakeholders to break down barriers and share information.

Reviewing multiple definitions of social capital it is certain nurses possess social capital and should reap the benefits of the application of the concepts of trust, goodwill, and reciprocity within their profession. Lin (2005) defined social capital as an embedded resource residing in social networks. Burt (1997) and Coleman (1988) defined social capital as the wealth of relationships a person accrues within and beyond an organization, their connections. Social capital is the value a person adds through contact with other people, is a quality of connection between people and a metaphor for advantage (Burt, 2005). Coleman further asserted social capital is “defined by its function” (p. S98) formed by many different entities with one common aspect, and facilitated by action among people within any given structure. Burt contended social capital, in the form of social status or reputation, can be derived from membership in specific networks, particularly those in which such membership is restricted. Nahapiet and Ghoshal (1998) adopted the view that social capital is the “sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit” (p. 243), and viewed social capital in structural, relational, and cognitive terms. Pearce and Smith (2003) stated social capital is a community-level variable whose individual-level counterpart is measured by a person’s social networks. The World Bank (2006) has arranged the concept of social capital in a framework with six dimensions. Table 5 lists the dimensions of social capital.

Where do nurses derive social capital? Hofmeyer and Marack (2008) postulate the role of social capital in nursing is related to “organizational integrity, healthy workplace

Table 5.
The World Bank's Dimension of Social Capital

Groups and Networks—social organizations and informal networks

Trust and Solidarity—towards neighbors and key service providers

Collective Action and Cooperation—how one works with others on joint projects/crises

Information and Communication—how do the poor access information/what effects lack of information has on access to information

Social Cohesion and Inclusion—what are the divisions and differences that lead to conflict

Empowerment and Political Action—what measure of control over institutions and processes that directly affect well-being

cultures, sustainable resource management, improved nurse retention, effective knowledge translation, and safer patient care” (p. 145). Nursing leaders can create an important source of social capital by taking steps to implement the six dimensions of social capital as laid out by the World Bank in Table 5 (Hofmeyer & Marack).

Nurses have had their value ascribed or allotted to them. They have not created their own value. When power is given up (to another group) and control has been abrogated, value disappears or is at least, radically diminished (Nahapiet & Ghoshal, 1998). Portes (1998) asserted social capital, as a non-monetary form of capital, can be perceived as providing sources of influence and power.

Burt (1997) contended there are two types of social capital, bonding and bridging. Szreter and Woolcock (2004) added another dimension, that of linking social capital, and defined this as “norms of respect and networks of trusting relationships between people who are interacting across explicit, formal, or institutionalized power or authority

gradients in society” (p. 655). Nurses are ‘bridgers’ of social capital. Bridging social capital allows for open communication among individuals or groups with weak ties and allows for the flow of new information, promotes exchange, and provides for a climate of creativity as well as the development of meaning of information (Burt; Granovetter, 1973; Putnam, 2000). Bridgers become brokers of new information offering nonredundant information, promoting sharing of ideas, and being afforded multiple opportunities. Nurses are brokers of information but may lack the “vertical power differential” (Szreter & Woolcock, p. 655), providing linking social capital that enables groups to build social capital across institutional power differentials. Szreter (2002) contended acknowledging linking social capital allows for the analysis of power and influence in the patterns of social relationships in a politically organized unit.

Nurses are the one formidable link among all aspects of health care. Nurses link critical information from patient to health care provider, providing safe, quality care. This is where nurses derive their social capital. Nurses link, bridge and bond diverse communities. Nurses may bond groups together in a closed communication system building trust, and reciprocity, but this bonding in a closed group, although creating security can be inflexible and create dependency (Burt, 1997). Perhaps more importantly nurses bridge, communicating new ideas and information among close and distant groups. This ability to bridge, to create connection and trust, fosters a culture of safety. Burt described “bridgers” as possessing rich social capital and as Portes (1998) contends, offers power. See Figure 2 for a model of Social Capital.

Technology Acceptance Theory (TAT) and Social Capital Theory (SCT) interface with the user. TAT focuses on how technology is accepted by the user and is strongly

correlated with the perception of usefulness. Technology acceptance is also strongly influenced by the person's attitude toward performing a behavior coupled with the weight of influence by others deemed important by that individual (Davis, 1989; Fishbein & Ajzen, 1975). Knowledge of TAT assists in comprehending the user's intent and offers a means by which to facilitate introduction and acceptance of technology into an environment. Garnering social capital offers a means to achieve an end, a means to achieve a goal and a means to achieve mutual benefit. If a goal is technology acceptance and implementation, then achieving this end may be facilitated by building a history of trust and reciprocity among those people with whom one works and has relationships.

Now it is time, with documentation of our work through the use of the EHR, to remove the transparency of the care we provide. By describing, measuring, and validating what we accomplish, nursing can demonstrate how we provide scientific interventions in the care we offer, improving patients outcomes with safe quality care, and finally making our value visible (Saba & Taylor, 2008).

Nursing Work Design

Nurses play a critical role in patient safety (Health Information Management Systems Society, 2004; Page, 2004). A fractured healthcare system creates errors in patient care. Safety has become an important concern for nurses due to the fact patient acuity is higher than in the past and the sophistication and technological intensity of patient care services is growing. Nurses and nursing assistants comprise 54% of all healthcare workers and are the first line of defense in patient care. Nursing care is of tremendous importance to the quality of care and safety of the patient (Page, 2004). The less time spent with the patient, the poorer the patient outcome. Leape et al. (1995) stated

nursing's vigilance defends patients against errors and that 86% of all potential medical errors were intercepted by nurses. Pronovost et al. (2003) reported physicians were less aware of safety issues than nurses and when rating safety as an issue, nurses rated safety higher than physicians.

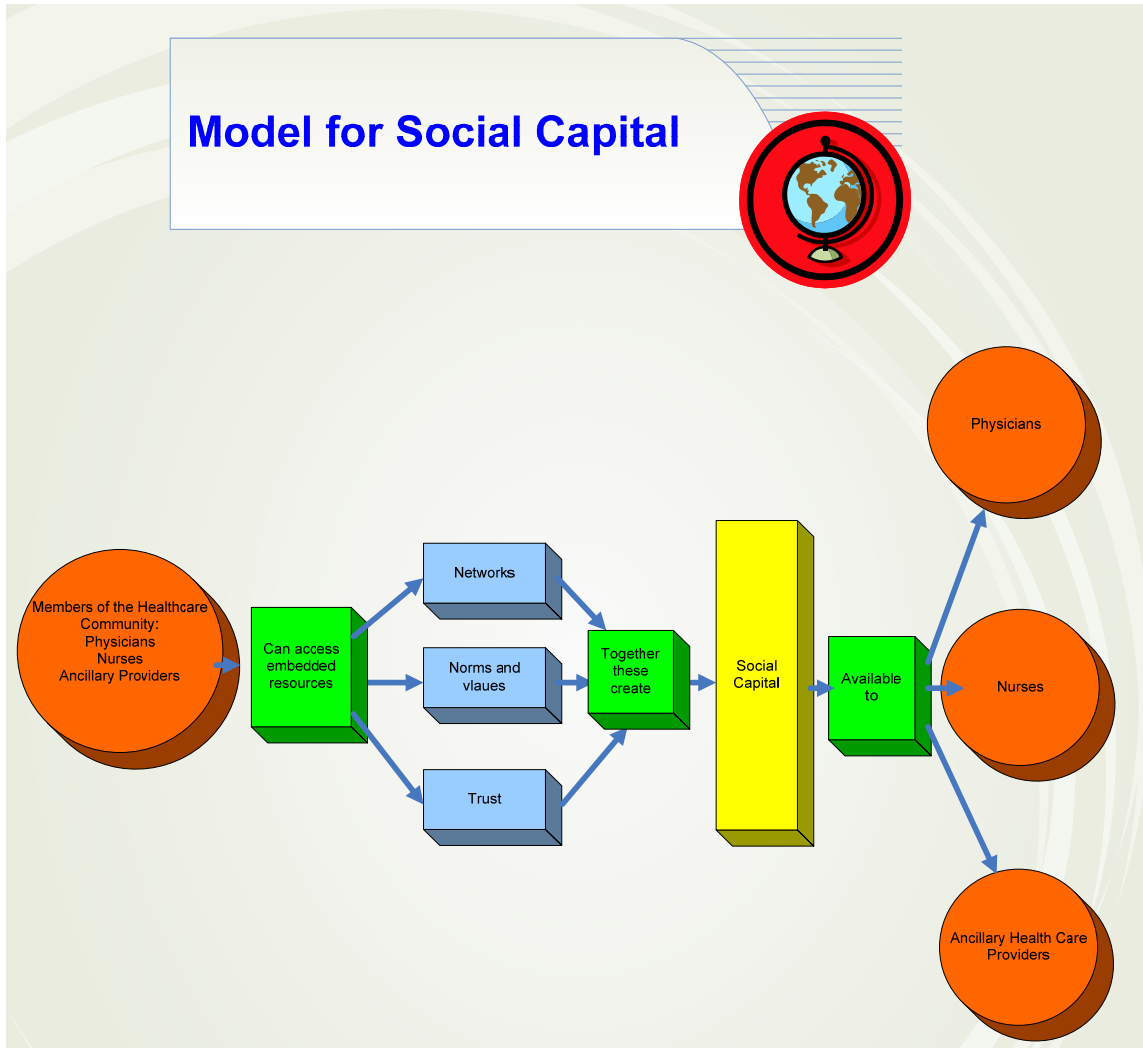


Figure 2. Model of Social Capital; The model is based on the work of Cohen & Prusak, 2001; Coleman, 1988; Lin, 2005; van der Gaag, 2005

It is critical to determine how and why nurses use HIT in order to derive the benefits from it. Webster (2004) stated the usability of HIT determines its employment by nurses. If IT is not easy to use, people leave (Nielsen, 2003). Nielsen defined *usability* as a quality attribute, which assesses how easy it is for the user to interact with the computer interface for specific tasks in a specific context. See Table 6 for these usability characteristics. The usability attribute can be used to describe methods for improving ease-of-use during the process of creating the computer's interface design. Nielsen has described usability has having five components.

As important as usability is the utility or the design's functionality; does the computer do what the users want it to do? The usability of a system ultimately benefits the patient; however in order for it to be effective, usability must serve the individual healthcare provider as well as the entire healthcare team.

Table 6.
Nielsen's Usability Components

Learnability: how easy is it for the learner to accomplish tasks the first time they are confronted with them

Efficiency: once the design is learned, can the tasks be performed quickly

Memorability: when returning to the design how easily is proficiency reestablished

Error: how many errors are made, how severe, and how easily does the user recover from these errors

Satisfaction: how pleasant was using the design

Page (2004) reported nursing's ongoing assessments of patients are directly related to better outcomes in patient care and the need for training in new technologies in the work environment is critical to maximizing nursing's capabilities. This report focused on providing safety and quality in healthcare, and most importantly, these patient care qualities were closely connected with computerized information systems. These new technologies include interacting with computer workstations and automated computer protocols, use of the World Wide Web (WWW), and the use of the internet and intranet. Knowledge and use of standardized terminologies, use of wireless communication devices such as personal data assistants (PDAs) and telecommunications devices, as well as knowledge of and ability to access data repositories are all necessary for working in an IT environment (Bakken, Cimino, & Hripcsak, 2004).

The need for improvement in computer literacy of nurses is critically important. Fully using healthcare information technologies, nurses can protect the patient through enhanced surveillance and monitoring, mitigate medication error using bar code technologies, mitigate knowledge error with decision support systems, and prevent procedural errors through the use of computerized provider order entry (CPOE) (Simpson, 2005). Ball (2005) contended nurses help coordinate all facets of activities related to the patient and these activities must be carefully documented. Data must be integrated, easy to access for the nurse (as well as the patient), and not stored in inaccessible silos. This systematic collection of data can reduce redundancy of information and improve fiscal efficiency. Quality of care is improved as data is transformed into information and information is transformed into knowledge used for evidence-based decision making at the point of care. Assessment of the overall process

can be examined to correlate nursing actions and if needed, changes can be made to improve the safety and effectiveness of care (Abdrbo, Hudak, Anthony, & Douglas, 2009). Ball emphatically stated the revitalization and redefinition of the role of the nurse and nursing practice is one of the outcomes of HIT initiatives.

Coiera (2006) discussed the complexity and scale of human interactions in a health care system and warned that miscommunication can have terrible consequences. Patients now have multiple healthcare providers needing to share accurate, timely information in order to provide quality management. Communication using IT, though not a panacea can provide direct communication with team members. At the point of care, the nurse may lack critical information needed for patient treatment. HIT can provide any time, anywhere clinical support for decision-making processes and assist in eliminating errors in judgment of commission or omission. HIT can provide computerized provider order entry (CPOE), which provides for erroneous decision alerts and decreases time searching for a physician to clarify a confusing order or illegible handwriting.

HIT can sent alerts to nurses regarding the five “rights” of medication administration (right patient, right drug, right dose, right route of administration, right time and frequency) and offer guidelines and scientific data to support best practices allowing the nurse to discard intuition and unmethodical clinical experience (Bakken, 2006; Kausal et al., 2003; Pravikoff, Tanner, & Pierce, 2005). Dispensing technologies, bar coding, and product labeling are all procedures enabling the nurse to decrease the patient’s odds that they will be exposed to risky outcomes. Perhaps most importantly, implementing HIT allows the nurse to gather and store quality data and information

regarding patient care and outcomes at the point of care, thus providing information for multiple disciplines and institutions to share data for best practice analyses (Bakken, Cimino, & Hripcsak, 2004; Saba & Taylor, 2008; Sorra & Nieva, 2004).

Briggs (2003) asserted nurses are well suited to HIT communication because they are facilitators, communicators, critical thinkers, and problem solvers. Hobbs (2002) stated there is little agreement among nurses about specific computer literacy skills, nevertheless a consensus was reached that the computer-competent nurse possesses a general understanding of computer hardware and software, combined with a positive attitude regarding how technology benefits nursing, and the healthcare environment in general. Sorra and Nieva, (2004) stated as nurses are able to make safe decisions with good information using IT, their documentation becomes vital to the healthcare team and nursing can increase their valuable contributions to the care of the patient.

Nursing's Role in Implementing EHR

Implementation of an IT system is a complex project. Duff and Casey (1998) suggested the challenge is to coordinate the disparate functions into a fully integrated system that supports practitioners. Success factors prior to implementation of an IT system are a function of the interrelationship among the users-healthcare providers, the institution(s), and the system components. Coiera (2003) stated there are two ways in which a problem can be solved using a technology solution-technology-driven or “what problems will best be solved by using this technology?” and problem-driven or “what is the best way to solve this problem?” (p. 124). See Table 7.

Most significantly Coiera stated these stages do not necessarily fall into a linear sequence, are iterative, and may progress through stages only to be reevaluated and reassessed to suggest improved

Table 7.
Coiera's Key Stages of the Information System Life Cycle

Requirement analysis
Functional specification
Architecture design
Software programming
Unit test
System integration
Acceptance test
User training
Outcomes assessment

system functionality. As an IT system is implemented, organizational change needs to be addressed. Examples include, how are the staff prepared and trained, what are the process changes, how will the new system affect continuity of patient care, and who will provide HIT and administrative support? (Dillon, Blankenship, & Crews, 2005).

There may be a traditional organizational culture that directs nursing practice with a set of informal standards of behavior that guide norms and values (Dienemann & Van de Castle, 2003). However, most critically, the determinant of the success of a HIT project is the people who will be using the system (Kirkley, 2004). Nurses are the personnel who are involved with every aspect of patient care and who will be using HIT at the point of care. Nurses are responsible for the ongoing surveillance of the patient which involves the nursing process from assessment to evaluation (Page, 2004). Nurses are the 'frontline' of a patient's defense and perform the coordination and integration of care of services from multiple providers (Joint Commission on Accreditation of Healthcare Organizations, n.d.; Page, 2004). Shabot (2006) claimed "nurses are the 'magical glue' that hold organization together; they have the greatest knowledge about

workflow and process, and understand the big picture of providing safe, effective care to patients” (p. 268).

Barriers and fears exist in the nursing culture regarding the adoption of IT. These fears involve technology implementation, seeing technology use as at variance with clinical processes, personal fears and prejudices, and fear of losing contact with what some nurses value most, interpersonal contact with patients and creating alienation from their patients (Ammenworth, Mansmann, Iller, & Eichstadter, 2003; Simpson, 2008). Dienemann and Van de Castle (2003) asserted nurses prefer individualized care, professional autonomy, and providing direct services using the nurse’s clinical judgment. Kirkley and Stein (2004) reported the fears of nurses may be cultural in nature and stem from a wide variety of factors including speculative fears, loyalty to paper documentation, and perceptions of the system prior to use. Timmons (2003) reported nurses felt the use of computers was time consuming and feared losing control but suggested that with education this technophobia could be overcome. Similar fears among nurses regarding the adoption of HIT were reported by Linder et al., 2006; Moody et al., 2004; Poissant et al., 2005; Simpson, 2005; and Wilbright et al., 2006.

Barriers to computer use included not involving nursing representation in the HIT implementation process, the electronic system speed being too slow or ‘down’ frequently, increased documentation time using an EHR, too many interruptions causing distraction, and subsequent falling behind schedule (Institute of Medicine, 2000; Page, 2004). Furthermore, when nurses do not feel computer literate feelings of discomfort may manifest as resistance to computer use, delays in obtaining information, and inaccurate and incomplete data entry. Not being able to type fast enough, preferring to write long

prose notes, feeling depersonalized and rude to the patient due to charting in the patient's view or not being able to make eye contact with the patient, and reduction of time spent with the patient are all perceived barriers to computer use (Kirkley & Stein, 2004; Linder et al., 2006; Simpson, 2004, 2008). Systems that do not provide important benefits to users or conform to their professional values and work patterns may lead to resistance, which may manifest itself as refusing to use a system, criticizing it, or minimizing its use (Kossmann & Scheidenhelm, 2008).

As nursing education develops and implements programs with attention to advanced computer-literacy skills, a new paradigm of care may emerge—one where information technologies support best outcomes with regard to client care. The necessary practice-competencies and skills needed to function in an environment that has HIT for patient care support has not been provided in undergraduate nursing education (Barton, 2005; Booth, 2006). If the nurse wishes to be successful in providing quality care to the patient they must be able to access and evaluate professional literature in print and on the internet, use research to recognize if findings can be translated to clinical practice for best practices, be interdisciplinary, consist of quality improvement approaches, and use informatics (Bakken et al., 2004; Courey et al., 2006; Courtney, Demiris, & Alexander, 2005; Greiner & Knebel, 2003; McNeil et al., 2003; Pravikoff, 2005; Retsas, 2000; Shorten et al., 2001; Skiba, 2006; Teaching Informatics Guiding Education Reform Initiative, 2006).

Nurse Informaticist (NI)

Identifying the organizational culture in which the user exists assists the NI in developing various implementation strategies. The NI identifies communication patterns

that will help her identify computer user anxiety and effectively manages an educational milieu to control for these potential problems (Gefen & Straub, 1997). The NI weighs the relative influence of the effects of gender, prior IT experience, social influence, physical ability as well as profession identity on the user. The NI may need to set realistic expectations for the inexperienced user, create physically separate and/or varying speeds of training programs to account for gender, social influence, experience or education. IT models may be employed diagnostically in order to test implementation of systems with regard to various influences on behavior (Taylor & Todd, 1995).

The NI may need to offer assistance to users who may foster unrealistic expectations regarding system use and may need to have their expectations thoroughly explored in order to prevent potential system implementation failure. The NI should consult the nurses who will use the system at the initial level of interface design as well as discuss documentation strategies and best use practices. Feedback should be requested and reviewed and the system re-evaluated based on the recommendations. The NI should assess ease of use, usefulness of design and application, speed of task completion, and type of errors committed during use, evaluate the system, and redesign as necessary (American Nurses Association, 2008). The NI may be called upon to educate users as to the need and relevance of chosen HIT systems, assisting managerial personnel to share with users the underlying value and effective use of new HIT systems (Malhotra & Galletta, 1999).

These factors together and their relative influence on and among each other affect the manner in which the NI approaches the problem of implementation. The NI may suggest alternative ways in which potential problems can be managed effectively. Once

the NI identifies mediators and moderators of technology use, educational programs can be developed to maximize the user's acceptance.

Local EHRS as Infrastructure for NHIN

Local healthcare networks will form the infrastructure for the NHIN. These local entities will form RHIOs that will implement RHI exchange networks. (American Health Information Management Association, 2005). Nursing can play an important part in the implementation of RHIOs through designing and implementing usable HITs that benefit both the healthcare provider and the healthcare organization. RHIOs are collaborative organizations focused on providing leadership, fiduciary responsibility, and governance for development of e-health initiatives in local regions. They are consumer/patient-centric and offer secure health information exchange among health care industry stakeholders in a designated community. They are not necessarily a central database but rather a central index of information that is governed by a third party. Data will be exchanged among physicians, hospitals, labs, pharmacies, public health agencies, and patients (Brailer, 2005; Lorenzi, 2003; Yasnoff, 2004).

Key principles to developing RHIOs are trust commitment, and vision shared among all members of the data exchange community. Trust should be built among the members with joint ownership and accountability, with balanced interests, without hidden agendas or dominant players. Commitment needs to be in place for support from key state government officials including the governor, academic medical centers and key hospital leading health plans, insurers, employers, and professional organizations (Brailer, 2005; Lorenzi, 2003; Yasnoff, 2004).

Conclusion

The use of HIT has as its goal the improvement of health care--health care delivery and health care quality. Proponents anticipate with the increased use of HIT, health care will improve in safety and accuracy, become more efficient, timely, equitable, and improve the security and confidentiality of patient records. In order to achieve this goal, use of information technology must become a fluid experience.

Nursing vigilance defends patients against error. Safety has become a pressing issue due to a fragmented system that fails healthcare providers and their patients. Point of care data entry and retrieval must be made available to nursing so patient outcomes can be documented, priorities can be organized, decision support used, and evidence-based practice used for patient care facilitating direct communication to team members. Because of the growing sophistication with technology, it is imperative to understand how and why users approach HIT.

The Technology Acceptance theory suggests when someone forms an intention to act; they will be free to act without limitation. In practice however, there are multiple factors that mediate technology acceptance. These factors—time, ability, environmental or organizational limits, and unconscious habits—all, limit freedom to act (Davis, Bagozzi, & Warshaw, 1989). To determine how and why we use IT is to derive the full benefits of IT. Examining belief factors, antecedents and moderators are tasks easily performed by a nurse informaticist. Using the skills in observation, assessment, and evaluation the NI can affect positive change in the acceptance of IT.

As nursing documents the value it adds to the safety of health care, positive patient outcomes, and scientifically based practice, the value of nursing presence

increases. Nurses will be valued members of multidisciplinary teams providing patient care that is safe, equitable, timely efficient, and patient-centric, thus achieving the IOM's vision (Institute of Medicine, 2001).

Chapter 3. Design and Methodology

Introduction

This study describes current conditions of EHR implementation in the State of Kansas, using a descriptive methodology. A review of the literature revealed gaps with regard to nursing's contribution to the development and implementation of the EHR in the State of Kansas. Although there is scholarly literature available with regard to nursing education and information technology (Bani-Issa, 2005; Connors, Warren, Weaver, & Miller, 2002; Connors, Warren, & Weaver, 2007; Thompson & Warren, 2008; Warren & Connors, 2005; Warren, & Wilson, 2006; Weaver, Warren, & Delaney, 2005) as well as the State of Kansas Commission investigating the EHR and health information technology applications (Health Information Security and Privacy Collaboration, 2007; Kansas E-health Advisory Council, 2010; Kansas Health Care Cost Containment Commission, 2007; Kansas Health Information Exchange/Kansas Health Information Technology Policy Initiative, 2007; Kansas Health Policy Authority, 2005) no literature was discovered as to the specific role of nursing in the application, development, implementation, or evaluation of EHRs in hospitals within the State of Kansas.

This information is important due to the fact that government officials and policy makers, within the State of Kansas, are actively involved in creating HIT systems that will promote the quality, efficiency, and safety for all the citizens of Kansas. Since nursing is the health care provider that is most frequently present at the point of care, and therefore a frequent user of an EHR it is imperative that there is knowledge of nursing's contribution to, participation in, and development of, an EHR system.

The information from this study can inform the Kansas Statewide Health Information Exchange Advisory Council, the State of Kansas Executive and Legislative branches, chief nursing officers, and nurse informaticians regarding the progression of EHR implementation and can provide academic institutions with data regarding the role that nursing has in the development, implementation, and evaluation of the EHR. Evaluating this data will assist in determining some of the networking and technology adoption obtained by nursing to achieve the infrastructure supporting quality care as envisioned by the IOM, NCVHS, and the ONC.

Design

This cross-sectional, descriptive study was used quantitative methods to analyze numerical data through statistical procedures in order to describe phenomena or assess the magnitude and reliability of relationships (Creswell, 2004; Polit & Hungler, 1995). When the main objective is to portray characteristics of persons or groups and the frequency with which they occur, descriptive analysis is used.

Setting and Sample

All non-psychiatric hospitals in the State of Kansas as identified by the Kansas Hospital Association (KHA) constituted the setting (Appendix E). The Chief Nursing Officer (CNO) or their equivalent were invited to participate in this study and thus constituted the sample.

Surveys were sent to all CNOs who are employed by hospitals in Kansas. Sample size reflected the number of hospitals from KHA. As of December 2008, Kansas had 125 hospitals.

IRB approval was obtained from the KUMC Human Subjects Committee. Due to the nature of the survey information exempt status was requested. Respondents were assured of anonymity and confidentiality and only summary data are reported. An introductory letter was sent with written instructions stating the risks and benefits of the study, assuring the respondents anonymity and confidentiality, and included the right to refuse to participate or to answer any question. Participation in the study implied consent of the respondent.

Survey Development and Testing

A survey method was employed to gather data. The survey content reflected concepts derived from the synthesis of the literature and the theoretical framework. The survey was designed to obtain information from a population about their ideas, feelings, health, beliefs, social and educational backgrounds, and the interrelations of variables within those populations (Fink & Kosecoff, 1998; Polit & Hungler, 1995). This survey was self-administered and questions were worded that are clear, simple, unambiguous, and parsimonious. Clarity of meaning was developed and technical terms respondents may be unfamiliar with were defined. Items are short, avoiding double-barreled items whose subparts have two different possible answers and negative wording. Explicit instructions on how to record responses were provided. The survey method is limited only by what the respondents may report on the topic and the relative superficiality of the responses may not delve deeply into the complexities of human behavior and feelings (Polit & Hungler, 1995; Waltz, Strickland, & Lenz, 2005). For this study, using the descriptive design with a survey methodology facilitated the identification of information

regarding the implementation of an EHR of the respondents in a manner that is unambiguous, economical, flexible, and provides quality information.

In order to develop a valid survey, the survey was sent to nursing informatics experts. The items are based on the current literature and reflect the synthesis of literature and interviews with experts in the field of informatics from the University of Kansas. The items were designed to reflect the components of the theoretical framework of this study, namely Technology Acceptance Theory and Social Capital Theory to clarify information about the implementation and use of the EHR. The survey was pre-tested in two ways: it was submitted to a small panel of EHR implementation experts and a small panel of nurse executives within the State of Kansas and Missouri.

The survey was tested using the KUMC survey 'service.' This service transformed the written survey into an electronic form so that a web page link can be embedded in the survey and sent to the respondents. The staff at the University of Kansas Medical Center's Internet Development Department offered direction and advice regarding the design of the survey. Suggestions with regard to developing an online format that would be attractive, convenient, and easily navigated by the respondents were incorporated into the survey.

These respondents tested the instrument with regard to clarity of directions and intelligibility of questions. The data submitted by these respondents are directly retrieved and reviewed from this service and analyzed by the researcher. Questions regarding identified objectives of the study as well as their relevance and readability of each question are queried. Focus may be regarding the instructions on the survey, and a

discussion on what the meaning of the answers are and how they group, may be helpful to refine the clarity and identify any other problems with the final survey (Fowler, 1984).

A content validity index (CVI) was calculated using the data received from the introductory survey, to determine the statistical validity of the survey. Lynn (1986) suggested the researcher use a two-stage process in calculating a CVI. First the Development Stage, wherein the dimensions of the content are identified and items are developed to reflect the scope of the content domain. These items are then gathered into a “usable, testable format” (p. 385) and the Judgment Stage begins. The items are now presented to an expert panel for their judgment regarding the relevancy to the study’s objective using a 4-point ordinal rating scale from ‘not relevant’ to ‘very relevant.’ For this study the panel was also requested to comment on the readability of the items using a scale from ‘ambiguous’ to ‘unambiguous.’

The CVI calculated was 0.88 using five informatics experts. Polit, Beck, and Owen (2007) proposed a CVI of 0.80 or higher, using the less conservative method of item-level scale averaging technique, shows evidence of good content validity. Furthermore, Polit, Beck, and Owen, contended the survey could be composed of items experts completely agree upon and others that experts have “modest amount of disagreement” (p. 467). The survey was refined to reflect the analysis of this data from experts in the field. No data from this preliminary questionnaire was used when analyzing the final data set. There was no comparison to any other instrument’s validity, as this instrument is developed specifically for this study.

Survey items consist of open and closed questions. The closed questions require the participant to select a choice by selecting an appropriate ‘box’. The survey consists of

five main categories of questions. These categories are demographics, EHR and support of nursing practice, nursing's role in the implementation of the EHR, factors that lead to the acceptance of the EHR by the nursing staff, what types of documentation are in the EHR, and the type and strength of the respondent's social networks. Within each main category are two question types, Likert-type responses from "not at all" to "a large extent" and one open-ended probe question of "anything else you would care to add?"

After the conclusion of the analysis of the initial instrument, the survey was finalized to gather data with regard to the research questions and was administered via the KUMC survey service. The survey is included in Appendix B.

Data Collection Methods

Names and email addresses of the identified participants were entered into a database for use in distributing the survey and subsequent follow-up. An introductory email was sent to all CNOs. This email, consisting of informed consent and instructions on how to complete the survey, was sent to all CNOs of hospitals in the State of Kansas. See Appendix A for the informed consent letter. Appendix B includes the instructions on how to complete the survey as well as the survey itself. Follow up phone calls were made to each CNO one week following the initial email correspondence. The link to the survey via the KUMC survey provider, specifically the web page link, was provided in the email correspondence.

The format of a web-based survey was chosen because of the anticipated ease of use for the participants, instant distribution, minimum cost and time, and ease of analysis (Cook, Heath, & Thompson, 2000; Wyatt, 2000). Schleyer and Forrest, (2000) cited the graphical interface as an enhancement to survey return namely use of color, innovative

screen design, and question formatting. The disadvantages of web-based surveys are incompatibility and usability problems, programming error using web-based surveys, and the concern of anonymity of the respondents (Cook, Heath, & Thompson; Schleyer & Forrest; Wyatt, 2000).

As with all surveys, the response rate can be a potential limitation. This limitation was minimized by sending a series of reminders. Follow-up to the initial inquiry to participate was made five business days after the initial email correspondence and another link sent to the participants who had not responded to the questionnaire. Dillman (2007) proposed mixing communication modes for optimal response rates, namely, reminder mailings, follow-up phone calls, and combining telephone with in-person interviews. Fowler (2009) stated that similar modes for a greater response in postal surveys, work as well for internet surveys i.e. “identifiable sponsors, well-designed instruments, financial incentives, and repeated contacts, including mail and phone requests” (p. 61). Cook et al. (2000) suggested introductory contacts, number of contacts, and personalized contacts were associated with the higher response rates, although they noted a decreasing rate of returns with an increasing rate of reminders.

An adaptation of a “Position Generator” (Lin & Dumin, 1986; Lin, Fu, & Hsung, 2005, p. 77) was used to generate the magnitude of strength of ties in social networks. The Position Generator (PG) was developed using occupations from the 1960 U.S. census survey (Lin & Dumin). Lin stated that the PG was based on the theory that wealth, power, and status are universally valued and that social resources are reflected in occupational prestige. Lin and Dumin contended the PG measured social resources accessed by the individual and that these resources delivered returns on attained status.

Lin, Fu, and Hsung stated that measuring social capital lies in the understanding of how individuals access social capital, “how they take actions to mobilize the embedded and accessible social resources to generate returns for their well being” (p. 61). The PG focuses mainly on the presence of resources in social networks and measuring individual access to a prescribed choice of occupations and not merely the relationship between the respondents and the identified occupations. The PG checks access to social resources by querying respondents knowledge of people from a list of occupations and whether they are friends, relatives, or acquaintances. The PG assumes the stronger the tie, the more available resources and operates from a perspective of access rather than use. Van der Gaag (2004) stated it is a used tool to assess social capital in a general population.

The PG measures three constructs 1) extensity of ties or positions accessed by the respondents; 2) upper reachability or the highest position accessed; and 3) the range of occupation accessed (Lin, Fu, & Hsung, 2005). These constructs are weighted as: extensity of ties = 0.15; upper reachability = 0.21; and range of occupations = 0.65. The data was analyzed using this weighted scoring. The query regarding whether the respondent’s choice was friend, relative, or acquaintance was scored as; (1) if the respondent knew at least one person having any relationship with them or (0) if the respondent knew no one at all. Van der Gaag (2004) utilized this method of scoring for a general PG to reduce bias introduced due to the fact that in some cases weak ties may be more valuable than strong ties. Each respondent’s score was calculated and a summed score was obtained; the higher the score the greater the social capital. See Table 8 for the occupations and their values.

This score was correlated with perception of social capital and implementation of the EHR; used to determine any connection between social networks, social institutions, and social stratification; and whether these contacts have any bearing on the CNO's implementation of the EHR. The "Position Generator" has been validated in multiple studies, and its findings have been consistent across a "wide spectrum of societies" (Lin, Fu, & Hsung, 2005, p. 76) namely, North America, Asia, Europe, China, East Germany, Hungary, and other capitalist states (van der Gaag, 2005). Occupations chosen for the Position Generator were derived from occupational prestige research. (Lin, 1999; Nakao and Treas, 1994; Schooler & Schoenbach, 1994).

Table 8.
Occupation values in the PG.

Occupation	Value
Business executive	55
Business owner	62
CEO of a company	70
Domestic worker	22
Farmer	31
Federal/State employee	26
General office worker	26
Journalist	55
Lawyer	73
Mechanic	36
Manager of a company	62
Nurse	54
Physician	78
Policeman	40
Professor	60
Rancher	48
Reporter	55
Senator/Representative	69
Student	22
Teacher	60

Data Analysis

Data were analyzed using descriptive summary statistics using the SPSS software (SPSS, 2006). These descriptive statistics include measures of central tendency i.e. the mean, median, and mode, and measures of dispersion i.e., frequencies, ranges, variances, and standard deviations. Secondary analyses, measures of association, were performed using Spearman's coefficient of correlation in regard to predetermined variables. In order to use Pearson's correlations data must be measured on an interval scale and there must be a linear relationship among the data. Because this condition was not met the Spearman's non-parametric measure of association was used for analysis. These correlations were based on the research questions and explored to determine if any relationship can be realized. Correlations, although a measure of a relationship, do not imply cause and effect.

A Position Generator was used to construct the degree of strength of ties in the respondent's social networks. The data from the Position Generator (PG) were used to create network resource indexes i.e. measuring the range of ties or the difference between the highest and lowest accessed prestige positions; the upper reachability of ties or the highest accessed prestige of the position accessed by the respondent; and the accessibility of different positions or the number of positions accessed. The data from the respondents gave insight into what social resources and/or social networks the respondents have available to them. Lin, Fu and Hsung (2005) contended that the scores from the PG are a critical aspect of measuring social capital because how and with whom individuals intersect in a hierarchy, as well as reflect what embedded resources are available to them. Lin, Fu, and Hsung have computed a weighted sum of the three measures i.e. the value of

0.15 for extensity of ties, 0.21 for upper reachability or prestige score, and 0.65 for range of ties. A score was calculated for each respondent using this composite variable.

Erickson (2004) postulated that the PG measures a person's access to occupational positions through social relationships. Respondents with a large range of contacts have access to a greater diversity or variety of network and thus greater resources. Furthermore access to high prestige occupations lends higher prestige to the respondent. This is theoretically important because in contemporary society occupation reflects status (Erickson). Lin (2005) maintained that hierarchical positions as well as network location facilitate or hinder access to embedded resources and access to social capital is contingent on a number of structural positions, social contacts, and specific relationships. Embedded resources are indicated by wealth, status, power, and social ties. Lin (1999) asserted that the quality of social resources available to individuals within the social network influences success for goals. The quality of these resources embedded in network are accessed through these relationships and used as resources for purposive action.

Erickson (2004) stated that PG measures should include a large range of occupations to meet the theoretical contention that a wide range of occupations increases access to different resources. The PG should have a large number of occupations that are very well known, possessing clear titles.

Research Questions

1. Question 1. How many hospitals in the State of Kansas have implemented or are in the process of implementing an EHR?

This question was answered by summarizing these categories:

How many hospitals:

- a) Have implemented an EHR
- b) Are in the process of selecting an EHR
- c) Are in the process of implementing an EHR
- d) Have no plans to implement an EHR

The survey was sent to 125 hospitals. Those responding to the survey were tallied according to the above responses. A confidence interval was calculated using percentages from each category.

2. Question 2. From the perspective of the Chief Nursing Officer, if the EHR is in the process of implementation or has been successfully implemented,
 - a. How does the EHR support nursing practice? Questions 11-14 from the survey were used to report this response. The five choices were collapsed into a dichotomy of “From moderate to a large extent” and “Other” (which entails “don’t know”, “not at all” “to a limited extent”). These responses were then rank ordered. A histogram was used to report the frequency of respondents who report in these categories for each question.
 - b. What are the nurses’ roles in the implementation of the EHR? Questions 15-16 from the survey were used to report this response. The 5 choices were collapsed into a dichotomy of “From moderate to a large extent” and “Other” (which entails “don’t know”, “not at all” “to a limited extent”). These responses were then rank ordered. A histogram used to report the frequency of respondents who report in these categories for each question.

- c. What were the factors of their EHR implementation process that led to acceptance by the nursing staff? Question 17 was used to report the responses to this query. The 5 choices were collapsed into “From moderate to a large extent” and “Other” (which entails “don’t know”, “not at all” “to a limited extent”). These responses were then rank ordered. A histogram was used to report the frequency of respondents who reported in these categories for each question.
 - d. What information do nurses contribute about the patient to the EHR? Question 20 from the survey will be used to summarize this. The data was reviewed for commonality of themes using content analysis. This response was reported by tallying the number of replies to each category of subject. These themes are listed in order of frequency cited.
3. Question 3. What is the relationship between perceived social capital and the implementation of the EHR? This question was answered by calculating the number of points each respondent receives with regard to Question 22. Extensity of ties or number of ties was calculated and multiplied by 0.15; highest position accessed was calculated and multiplied by 0.21; and range of positions were calculated and multiplied by 0.65. This score reflected the amount of perceived social capital. This score was then correlated to Question 1 with these responses—have implemented their EHR, are in the process of selecting an EHR, are in the process of implementing an EHR, and have no plans to implement an EHR—using Spearman’s coefficient of correlation. A significance level was calculated to determine if there was any relationship between the categories and

the level of social capital. The variable names are: “have implemented”, “process selecting”, “process implementing” and “no plans”. These four variables were correlated with the social capital score each CNO received.

The responses to the open-ended comments were analyzed for commonality of themes. Elo and Kyngäsh (2008) maintained this process of content analysis allows the researcher to condense broad descriptions a phenomena enabling them to build a model, conceptual system, or map. Both deductive and inductive approaches are used in analysis of meanings, intentions, and communications. Elo and Kyngäsh contended there are no systematic rules for analyzing data but one should select a unit of analysis, a word or a theme, become immersed in the data, and conduct the analysis by using either an inductive or deductive approach.

Summary

The purpose of this chapter is to review the methods and procedures that were used to gather and analyze data for this study. This study is intended to expand the knowledge of the EHR implementation and functionalities in the State of Kansas. A cross-sectional, descriptive study was used because little is known regarding how the EHR is implemented in the State of Kansas and what impact nurses have on that implementation. To achieve the infrastructure supporting quality care as envisioned by the IOM, NCVHS, and the ONC it is important to have knowledge of how and what nurses do to affect this process. Evaluating this data may assist in determining some of the approaches and strategies used by nursing to enhance EHR adoption and implementation in the State of Kansas.

Chapter 4: Results

The purpose of this study was to identify the electronic health record functionalities of acute care hospitals in the State of Kansas with regard to nursing practice. From the perspective of the Chief Nursing Officer (CNO) or their equivalent, what is the nurses' role in implementation of the electronic health record, what nursing documentation is in the electronic health record, and what factors led to the acceptance of the electronic health record by the nursing staff? Furthermore what is the CNO's perception of personal social capital and its influence on the implementation of an Electronic Health Record (EHR).

A survey was designed for this project. Correspondence was sent to the 125 members of the Kansas Hospital Association (KHA). Kansas Organization of Nurse Leaders, a nurse executive group within the KHA, distributed the web link to the online survey. KHA's membership includes 125 community hospitals that work together to improve access, quality, and affordability of health care for Kansans. It was developed in 1910 as an organization to promote efficiency and economy in hospital management. KHA defines community hospitals as a general hospital with an organized medical staff of physicians with permanent facilities that include patient beds; medical, physician, and continuous registered nursing services for not less than 24 hour service everyday providing diagnosis and treatment for patients with a variety of medical conditions (Kansas Hospital Association, 2009). The hospitals range from large teaching hospitals to small community hospitals in 99 out of 105 counties in Kansas. Kansas, generally a rural state, has 83 Critical Access Hospitals, each with 25 beds or less.

Subjects

Of the 125 identified CNOs of the KHA, 71 responded to the query. Nine of those surveys contained no data, yielding 61 valid surveys as a final sample size for a return rate of 48.8%. The majority of the respondents are female (83.6%, n=61), between 41-50 years of age (36.1%, n=61), holding a master's Degree (36.1%, n=61), and have been in their current position for 1-2 years (27.9 %, n=61). They generally belong to professional organizations such as the American Nurses Association (ANA), the Kansas Nurses Association (KSNA), the Kansas Organization of Nurse Leaders (KONL), and Sigma Theta Tau (68.4%, n=57), but generally don't belong to civic organizations or clubs (78.6%, n=56). Number of licensed beds they supervise range from 12-644 beds with more having 21-40 beds.

Table 9.
Demographic data (n= 61)

Variable	Frequency	Percentage
Age (years)		
Less than 30	1	1.6
31-40	12	19.7
41-50	22	36.1
51-60	20	32.8
61-70	6	9.8
Gender		
Male	10	16.4
Female	51	83.6
Educational level	18	29.5
Associate's/Technical degree	17	27.9
Bachelor's degree	3	4.9
Master's degree	22	36.1
Post-graduate courses	0	0.0
PhD/EdD	1	1.6

Table 10
Position title and tenure (n=61)

Variable	Frequency	Percentage
Current position		
CNO	20	32.8
DON	24	39.3
V-P patient care services	7	11.5
Other	10	16.4
Current position (years)		
Less than 1	5	8.2
1-2	17	27.9
3-4	7	11.5
5-6	11	18.0
7-8	6	9.8
9-10	7	11.5
Greater than 10	8	13.1

Table 11
Demographics of the health care organization (n=61)

Variable	Frequency
Licensed Beds (<i>N</i> =58)	
0-20	9
21-40	28
41-60	2
61-80	3
81-100	4
101-150	4
Greater than 150	8
Number of clinics (<i>N</i> =57)	
0	1
1-3	39
4-6	6
7-10	7
Greater than 10	4

Not all respondents answered all of the questions. Those that had no plans for EHR implementation were instructed to complete the Demographic and the Social Capital sections only. There were only 26 surveys where every question was answered. Table 13 depicts the number of respondents by group who partially and completely.

Table 12
Professional service activities

Variable	Frequency	Percentage
Professional memberships (<i>n</i> =57)		
Yes	39	68.4
No	18	31.6
Member of civic organizations (<i>n</i> =56)		
Yes	12	21.4
No	44	78.6
Member of any clubs (<i>n</i> =55)		
Yes	11	20.0
No	44	80.0

Note: *n* reflects the number of respondents answering these queries.

Table 13
Number of respondents by group

	Respondents	Demographics	EHR support of nursing practice	Nurse's role in implementation	Factors leading to	Patient Documentation	Social Capital
Have implemented EHR	21	21	21	20	20	20	21
In process of implementing EHR	22	22	0	0	0	0	20
Are selecting EHR	9	9	5	6	6	6	2
No plans	6	6	0	0	0	0	5
Total	58	58	26	26	26	26	48

answered the questions in the survey. This variability in completing the survey is reflected in different numbers of respondents (n) in the analysis of each research question.

Research Questions

Research question 1: How many hospitals in the State of Kansas have implemented or are in the process of implementing an EHR? To determine how many hospitals had or were implementing an EHR, the question was asked regarding what stage the hospitals were in implementing an EHR, or if not, did they have plans to do so. Seventy-four percent have implemented or are in the process of implementing an EHR (see Table 14).

Research Question 2a: From the perspective of the Chief Nursing Officer, if the EHR is in the process of implementation or has been successfully implemented, how does the EHR support nursing practice? A Likert-type scale was used to answer this question with the responses of “I don’t know”, “Not at all”, “To a limited extent” and “To a moderate extent” and “To a large extent.” These five responses were collapsed into two dichotomous variables. “To a moderate extent” and “To a large extent” became “From a moderate to large extent”. “I don’t know”, “Not at all”, and “To a limited extent” became “Other” (see Table 14). The Likert-type scale responses were collapsed due to the difficulty respondents may feel in differentiating between categories; Likert-type scales do not give a full range of discriminability and respondents may be frustrated because of lack of choices and responses may differ from culture to culture. (Notes, 2006). The majority of the CNOs reported that EHRs improved access to information as well as information retrieval. They believed that EHRs provided greater

accuracy of documentation, made patient care safer, with less patient care error, while making care more patient centered. The CNOs felt more informed regarding the patients and used the computer to research patient diagnoses. Somewhat less than a majority used the computer to search for evidence based practice. A very small percentage reported that the computer is a waste of staff's time and that the computer favors efficiency over accuracy.

Table 14
Status of EHR implementation (N=58)

Variable	Frequency	Percentage	C.I. 90%	C.I. 95%
Have implemented an EHR	21	36.2	25.83-46.49	23.84-48.58
Are in process of implementing an EHR	22	38.0	27.45-48.41	25.44-50.42
Selecting an EHR	9	15.5	7.70-23.34	6.20-24.84
No plans for an EHR	6	10.3	3.76-16.92	2.50-18.18

Note: *n* reflects the number of respondents answering these queries.

Table 16 represents data recorded from Research Question 2a and reflects information that is reverse coded. For example, an original query asked the respondents if they agreed with the statement “the computer did not limit my critical thinking skills”. The agreement with this statement indicates the respondent is in agreement with the ability to utilize their critical thinking skills when using the computer. The six queries in Table 16 demonstrate the results of this reverse coding.

Table 15
How does the EHR support Nursing Practice?

Question	From a mod to lg extent		Other		Mean	St. Dev
	N	Percentage	N	Percentage		
Improves information retrieval	22	84.7	4	15.3	3.58	0.76
Improves access to information	19	73.1	7	26.9	3.35	0.98
Provides greater accuracy	18	69.3	8	30.7	3.37	1.02
Makes patient care safer	18	69.2	8	30.8	3.42	0.95
Less patient care error	18	69.2	8	30.8	3.15	0.88
Uses computer to research patient care diagnoses	16	61.5	10	38.5	2.85	0.88
Do other disciplines read nursing documentation	15	57.7	11	42.3	2.96	1.00
More patient centered	13	50.0	13	50.0	3.04	1.18
More informed regarding patients	13	50.0	13	50.0	3.15	1.08
Uses computer for evidence based practice	12	46.1	14	53.9	2.50	0.99
Staff transcribed nursing notes from scraps of paper	9	34.6	17	65.4	2.65	1.16
Measure patient's self care strategies	9	34.6	17	65.4	3.15	1.29
Saves nursing staff time	9	33.3	18	66.6	2.74	1.23
Prefers paper over computer charting	4	15.4	22	65.4	2.23	1.39
Waste of staff's time	2	7.6	24	92.4	1.62	1.24
Favors efficiency over accuracy	2	7.6	24	92.4	1.77	1.21
Measures patient satisfaction	1	3.8	25	96.2	2.19	1.65

Note: *n* reflects the number of respondents answering these queries.

An open-ended question followed this query, asking for any additional information the respondent would like to add. The commonality of themes expressed (n=8) regarded the identification of error with EHR usage, “medication errors have been

Table 16

How does the EHR support nursing practice? Corrected for reverse scoring.

Question	From a lg to mod extent		Other		Mean	St. Dev
	N	Percentage	N	Percentage		
Computer use limits critical thinking skills	0	0.0	26	100.0	1.89	1.42
Less personalized care	1	4.0	24	96.0	1.88	1.09
Staff spends less time with patients	4	15.3	22	84.7	2.19	1.47
Staff feels disconnected from patients	6	23.1	20	76.9	2.92	1.52
Staff feels disconnected from patients if the computer “goes down”	13	50.0	13	50.0	3.15	1.08
CNO feels disconnected from patients if the computer “goes down	17	65.4	9	34.6	3.31	1.23

decreased significantly with CPOE (computerized provider order entry) and bar coding of medications”; “the system brings more errors to the forefront”; “I know it will save a significant amount of nursing time” and desiring a system that was user-friendly and would increase nurses’ time with the patient; “I would like a system that is user-friendly, complete, and keeps the nurses with the patients”. These themes speak to the nurse’s desire to deliver safe care, acknowledging that the EHR could alert the nurse to a potential mistake in the delivery of care. It also speaks to Davis’s concept of ease of use being important to the end user.

Research Question 2b: What are nurses’ roles in implementing the EHR? A Likert-type scale was used to answer this question with the responses of “I don’t know”,

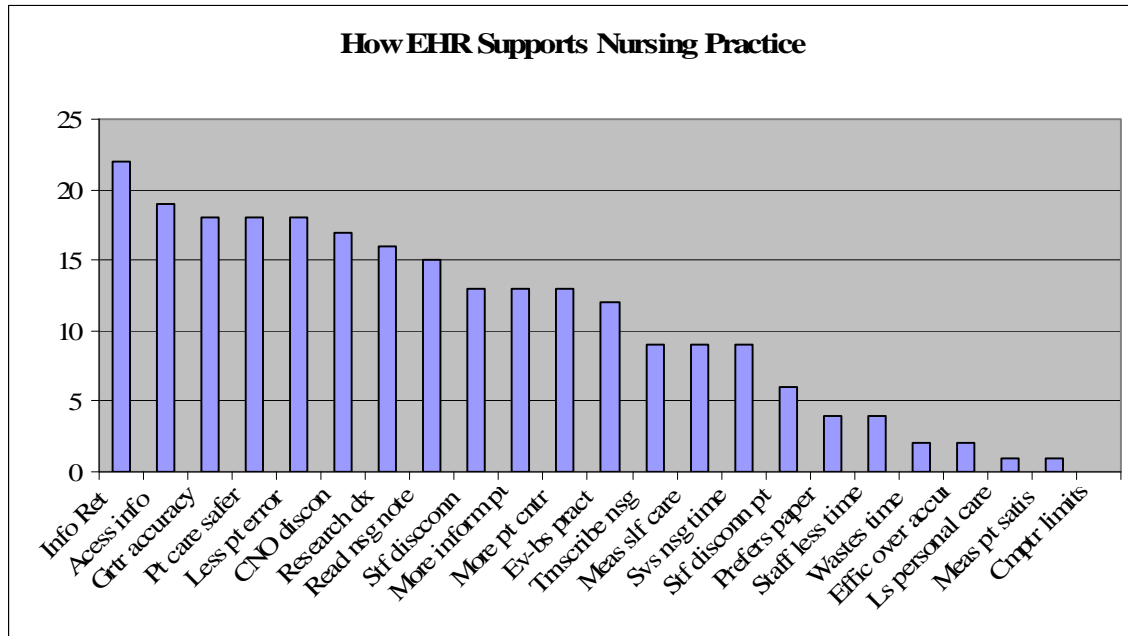


Figure 3. This figure represents a histogram of the results of Table 14, “How the EHR Supports Nursing Practice.” The vertical axis represents the number of responses (n=26).

“Not at all”, “To a limited extent” and “To a moderate extent” and “To a large extent.”

These five responses were collapsed into two dichotomous variables. “To a moderate extent” and “To a large extent” became “From a moderate to large extent”. “I don’t know”, “Not at all”, and “To a limited extent” became “Other”. This question identifies to what extent the CNO was involved in the EHR implementation process (see Table 17).

An open-ended question followed this query, asking for any additional information the respondent would like to add. The commonality of themes expressed (n=9) regarding what the nurses’ role was in implementing the EHR revealed that many CNOs had previous positive experiences with the EHR either through their previous employment or through educational opportunities; “implementation at other organizations and hospitals”; took informatics classes for my master’s degree’, “working with computers at school and through online education”. Having knowledge of, and previous

experience with EHRs, speaks to the ease with which nurses can integrate new technology.

Table 17
Nurse's roles in implementing the EHR

Question	From a mod to lg extent		Other	
	N	Percentage	N	Percentage
The 'Board' advocated for the EHR	20	76.9	6	23.1
I formed an implementation committee	19	73.1	7	26.9
I served on an EHR implementation committee	18	69.2	8	30.8
I chose to be on an implementation committee	18	69.2	8	30.8
I advocated for the EHR	15	60.0	10	40.0
I worked with the EHR vendor	15	60.0	10	40.0
I was on the EHR design committee	15	57.7	11	42.3
I was approached although I am not an expert	14	56.0	11	44.0
I participated in training nursing staff	13	52.0	12	48.0
I am an EHR expert	8	32.0	17	68.0
I was only peripherally involved in implementation	4	16.0	21	84.0

The question regarding previous experience with information technology by the CNO revealed that 27.8 % (n=61) had previous experience with IT with 63.9% not responding (see Table 18).

Research Question 2c: What factors led to the implementation of the EHR by the nursing staff? A Likert-type scale was used to answer this question with the responses of "I don't know", "Not at all", "To a limited extent" and "To a moderate extent" and "To a

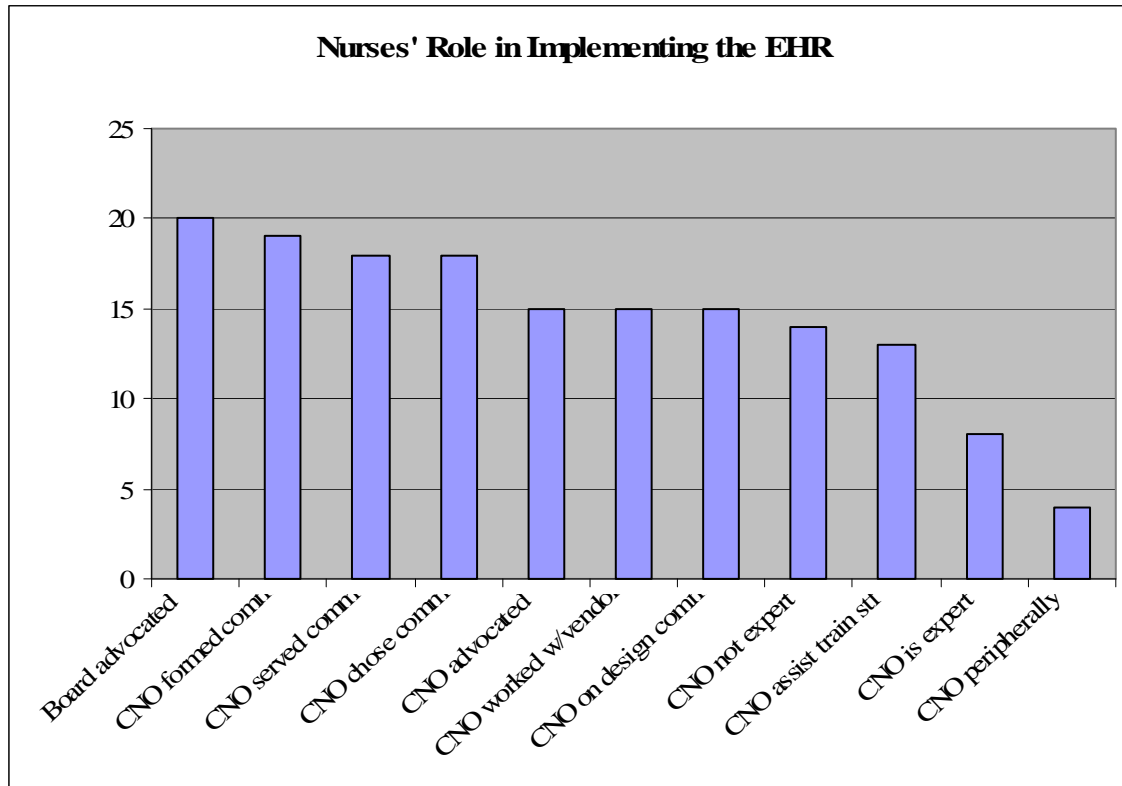


Figure 4. This figure represents a histogram of the results of Table 15, “Nurses’ Role in Implementing the EHR”. The vertical axis represents the number of responses (n=26).

Table 18

Previous experience with information technology (n=61)

Variable	Frequency	Percentage
Yes, I have previous experience	17	27.80
No, I have no previous experience	5	0.08
No response	39	63.90

Note: *n* reflects the number of respondents answering these queries.

large extent.” These five responses were collapsed into two dichotomous variables. “To a moderate extent” and “To a large extent” became “From a moderate to large extent”. “Idon’t know”, “Not at all”, and “To a limited extent” became “Other”. This question identifies to what extent the CNO and the nursing staff was involved in the EHR implementation process (see Table 19).

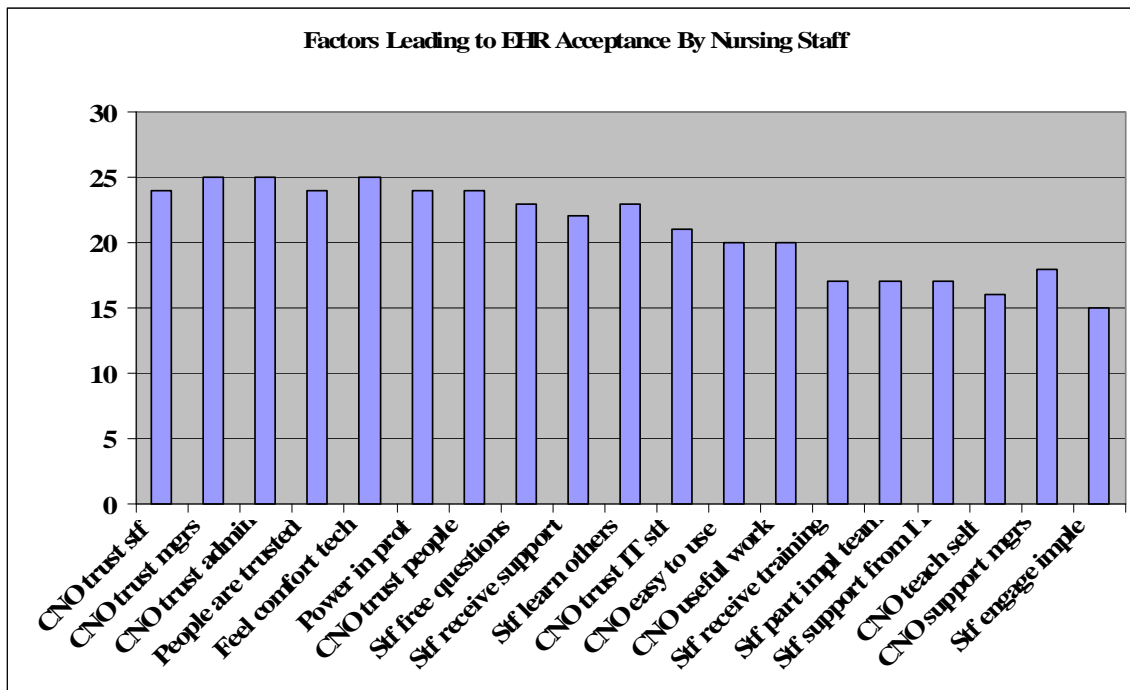


Figure 5. This figure represents a histogram of the results of Table 17, “Factors Leading to EHR Implementation By Nursing Staff”. The vertical axis represents the number of responses (n=26).

An open-ended question followed this query, asking for any additional information the respondent would like to add. The commonality of themes (n=8) expressed regarding what factors led to the EHR implementation by the nursing staff involved an eagerness to use the EHR, and an acknowledgement of the reality that there is a learning curve but this did not seem to be a problem as most nurses had been exposed to an EHR previously; “I think the nurses get back what they put into it”; “the nurses accepted the new change in documentation”; “I look forward to implementation of EHR in our facility”.

Table 19

Factors that led to implementation of the EHR by the nursing staff

Factors	From a mod to lg extent		Other	
	N	Percentage	N	Percentage
Personally have a trusting relationship with staff	24	100.0	0	0.0
Personally have trusting relationship with managers/directors	25	100.0	0	0.0
Personally have trusting relationship with hospital administration	25	100.0	0	0.0
In general, personally feel most people are trying to be helpful	24	100.0	0	0.0
Personally feel comfortable with technology	25	96.2	1	3.8
Do you feel powerful in your profession	24	96.0	1	4.0
Personally feel most people can be trusted	24	96.0	1	4.0
Staff feel free to ask questions regarding EHR	22	95.7	1	4.3
Staff receive support from nursing managers/directors	23	92.0	2	8.0
Staff were encouraged to learn from others	21	91.3	2	8.7
Personally have trusting relationship with IT staff	22	88.0	3	12.0
Personally feel system easy to use	20	80.0	5	20.0
Personally feel system useful in your work	20	80.0	5	20.0
Staff receive enough training from vendor/IT team	17	70.8	7	29.2
Staff feel part of implementation team	17	70.8	7	29.2
Staff receive support from IT staff	17	70.1	7	29.9
Personally feel responsible for teaching yourself about EHRs	16	66.6	3	33.4
Personally receive support from nursing staff with implementation	18	65.0	6	35.0
Staff were engaged in project implementation	15	62.5	9	37.5

Research Question 2d: What information do nurses contribute about the patient to the EHR? This question identified various types of documentation in the EHR, ranging from the majority of the respondents stating they used the EHR for admissions (63.2%), to the fact that the EHR is not the sole domain of the physicians; 100 % agreeing that the EHR is not used for physicians only (see Table 20).

Research Question 3: What is the relationship between perceived social capital and the implementation of the EHR? This question will be answered by calculating the number of points each respondent receives with regard to Question 22. Extensity of ties or number of ties is calculated and multiplied by 0.15; highest position accessed is calculated and multiplied by 0.21; and range of positions is calculated and multiplied by 0.65. The sum of these three values will reflect the amount of perceived social capital of each respondent. The results of this question were correlated with the responses regarding the implementation of the EHR. Spearman's rho was used to analyze the data for correlations. This nonparametric test is used in place of Pearson's Correlation Coefficient when the data is not normally distributed, when there is a small sample size (<100), and when nothing is previously known about the parameters in questions. Performing Spearman's rho demonstrated that Social Capital was not significantly correlated with EHR implementation ($r = -.013$, $p = .936$, $n = 42$). All tests of correlation were not significant: one-way ANOVA, Kruskal-Wallis, and the parametric Pearson's Correlation Coefficient.

In future studies, with regard to this subject, a common definition of what an EHR contains should be included in the initial introductory letter. Respondents may not have known to what extent their hospital utilized IT because of confusion about what

Table 20
What information do nurses contribute to the HER

Documentation	Frequency	Percentage
<i>Patient transactions</i>		
Admissions	36	63.2
Discharges	36	63.2
Transfers	30	52.6
Documentation of incident reports	19	33.3
<i>Diagnostics</i>		
Patient assessment	34	59.6
Allergy alerts	34	59.6
Diagnostic test results	31	54.4
<i>Nursing documentation</i>		
Nursing notes	34	59.6
Recording vital signs	34	59.6
Documentation of patient education	34	58.6
Documentation of wounds	32	56.1
Documentation of falls	30	52.6
Documentation of pressure sores	30	52.6
Medication administration record	29	50.9
Nursing care plans	26	45.6
Tracking treatments	15	26.3
No nursing documentation	3	5.3
<i>Physician documentation</i>		
Diagnostic interdisciplinary notes	25	43.9
History and physicals	22	38.6
Discharge summaries	22	38.6
Diagnostic consults	21	36.8
CPOE	13	22.8
Used for physicians only	0	0.0
<i>Administrative duties</i>		
Patient charges	29	50.9
Scheduling treatments	22	38.6
Other	10	17.5

Note: *n* reflects the number of respondents answering these queries.

an EHR contains. This definition of an EHR would obviate any confusion and may have improved the response rate of each question. Using an impersonal email may have reduced the number of respondents. The Kansas Hospital Association (KHA) sent the letter of invitation to the 72 CNOs of the 125 hospitals whose emails were available from their association. Initially this was thought to be to the researcher's advantage with endorsement for participation coming from the KHA. The initial return rate was minimal. The 52 remaining CNOs received telephone contact from the researcher. A rapidly increasing response rate was noted with the personal calls to the CNOs. This rapid response may have been due to the explanation of the project and its potential impact. For this project, personal contact suggested an increase in return rate. A reminder email was sent to the 72 CNOs and follow up calls were made to the CNOs who did not return initial phone contact.

Many responses were left blank or "I don't know" reported. With a quantitative study, even with requesting additional information after each major question (a qualitative query) less than 5 % responded to this query. This may be due to respondent fatigue as the survey would take approximately 15-20 minutes to complete. Upon examining the response time in the survey, there were multiple surveys that were opened and closed within less than five minutes. It is concerning that a large number of the social capital queries were left blank with one respondent stating, "What is the relevance of this section of who I know to IT implementation?" Although a parsimonious but complete definition was given in the introductory letter, respondents may not have had enough familiarity with the concept of social capital to apply it to this situation.

The analysis of the results indicated that these respondents want an EHR system supports nursing's concern with safety and efficiency. Furthermore the results indicate that these respondents are willing to be and are closely involved in the process of implementation as is reflected in the current literature (Bakken et al., 2004; Ball et al., 2003; Page, 2004; Priselac, 2003; Simpson, 2005). In the final chapter, Discussions and Recommendations, the results of this survey will be further examined.

Chapter 5: Discussion and Recommendations

This study investigated the functionalities of the electronic health record in acute care hospitals in the State of Kansas. Framed by Technology Acceptance Theory and Social Capital Theories a survey was developed to ascertain the status of the Electronic Health Record (EHR) implementation process in Kansas hospitals. The survey included questions soliciting the Chief Nursing Officer's (CNO's) perspective regarding EHR support of nursing practice, nursing's role in implementation of an EHR, factors leading to acceptance of the EHR by nursing, and what nursing documentation is present in their EHR. Furthermore questions were asked to determine the relationship between CNOs perceived social capital and EHR implementation.

The importance of this study arises from fact that the United States healthcare system as it currently exists provides dangerous, inefficient, inequitable care. The need to provide safe, secure, timely, quality care to patients is most urgent. Nurses are the personnel who are most often at the point of care. They comprise 55% of the health care workforce (American Nurses Association, 2008) and as such they are frequent users of any patient documentation system, paper or electronic.

The functionalities of an EHR system should reflect the users' needs for efficiency and usability. The literature informs us that for nurses this usability should include an EHR system that is accurate, provides decision support that is evidence-based, is rapid and efficient, reduces error and redundancy, provides confidentiality and is easy to use. In short, what is desired is an EHR system is one that will increase the user's performance and increase the quality of patient care. Identifying the functionalities that are in place in Kansas, will assist policy makers, hospital administrators, software

vendors, and nurse executives in developing EHR systems that ensure the user's best performance. Knowing the usability characteristics that exist, what factors led to this, and how it is supported by nursing will assist in identification of the extent and limits of systems in place and in the development of future systems.

Technology Acceptance Theory (Davis, 1989) hypothesized that the concept of how technology is perceived, i.e. whether it is easy to use or useful, is a fundamental determinant of its use. Technology Acceptance Theory has been identified as a predictor of user behavior across a broad range of computer technology (Mathieson, 1991). It was adapted from the Theory of Reasoned Action which stated behavioral intentions is a sum of a person's attitude toward performing the behavior, plus the weight of influence by others deemed important by that individual (Fishbein & Ajzen, 1975). Understanding perceptions of usability early in the design and implementation stages of an information systems project can be used to assess and predict the functionality and acceptability of a system by the end users. Perceived ease of use and perceived usability are two primary components of Technology Acceptance Theory. Intention to use a system is a direct function of the behavioral attitude towards the usability and use of a system (Davis, 1989). However, the perceived usability of the system is statistically more strongly associated with usage than is perceived ease of use, that is, users adopt technology primarily because of the functions it performs for them not how easy it is to use (Davis, 1989).

Social Capital Theory is less easily defined, although still quite useful. Social capital is the value a person adds through contact with other people and is a quality of connection between people, a metaphor for advantage (Burt, 2005). Social capital is

defined by its function and facilitates action among people in a given structure (Coleman, 1988). It is embedded within and available through relationships (Nahapiet & Ghoshal, 1998). Theoretically, it can be anyone with whom one has contact and who is an influence on one's behavior (van der Gaag, 2005). Social capital is a community level variable with individual counterparts measured by a person's social networks (Pearce & Smith, 2003). Social capital can be seen as providing a source of influence and power (Portes, 1998). Lin (2005) contended that there are three stages of mobilization of social capital, creation of social capital, having access to social capital and the use of created social capital. Burt (1997) identified two types of social capital: bonding and bridging. Further examination of the theory added the concept of linking social capital (Szreter & Woolcock, 2004).

Bonding social capital is defined as connections between people in similar circumstances such as friends, family, and close acquaintances. This bonding can lead to a tightly closed network providing trust, shared identity, and reciprocity. It can also lead to a closed network of self-interested people, who exchange redundant information and impose sanctions on members who do not comply with the status quo of the group (Portes 1998; Putnam, 2000; Szreter & Woolcock, 2004). Bridging social capital includes distant friends and acquaintances, as well as people acquainted through work. This open network generally consists of people unlike each other and offers rich, new information through exchange of ideas from external networks. The Strength of Weak Ties Theory (Granovetter, 1973) informs bridging social capital with the concept that people from distant, divergent networks can bring new information and resources together to create new knowledge that can be used as social, political, or economic influence (Putnam,

2000; Szreter & Woolcock, 2004). Linking social capital connects unlike people in dissimilar situations through organizations and broader systems. This aspect of social capital may link leaders who have authority with those whom they are in charge. Linking social capital provides an open network that builds alliances through exchange of information among leaders who may possess knowledge and resources that can be crucial in partnerships (Hofmeyer & Marck, 2008).

Nurses bridge, bond, and link healthcare providers and patients in the healthcare system using closed and open communication systems to provide safe, quality care. Healthcare “institutions are held together, glued together, enabled to function as an organism, by the nurse and nobody else.” (Thomas, 1985, p. 65). Understanding how nurses may use social capital to accomplish safe, quality care, and successful implementation of EHRs is imperative.

Discussion

The demographics of the respondents closely reflect those of a national survey of CNOs performed by Witt/Kieffer (2003). The national demographics of a CNO are 92% female; 34% aged 46-50; 57% with a BSN, with 52% having an MSN; 30% having 2-3 or 4-6 years in their current position. The demographics of this current study are 83.6% female; 36.1% aged 40-49; 27.9% having a BSN and 36.1% having an MSN; 27.9% having 1-2 years of experience and 29.5% having 3-6 years of experience.

The demographics of the health care organization suggest that the majority of the hospitals in Kansas are small: 48.3% less than 40 beds, reflecting the State population that is 2.8 million with a population density of 32.9 persons per square mile (U.S. Census Bureau, 2008).

Although 68.4% of the respondents belong to a professional organization, such as the American Association of Nurses, Sigma Theta Tau, and the Kansas Organization of Nurse Leaders, very few are members of civic organizations (21.4%). This statistic may reflect the rural nature of the population or as social capital theorists have hypothesized the break down of society that has become technologically dependent wherein people communicate at a greater rate through the internet, webcams, and telecommunication devices than in person (Putnam, 2000).

Of the responding CNOs, 74.2% have or are in the process of EHR implementation while 15.5% are in the process of selecting an EHR (N=58). Although the literature reports the national average for hospitals that have a comprehensive electronic record system is (1.5%) or have a basic system (7.6%), (Jha et. al, 2009), it is difficult to make a comparison with this study's results due to its small sample number. This large percentage of EHR implementation in Kansas may be due to its relatively low population density; however more likely it is due to the fact that Kansas has had 20 years of telemedicine in place that includes consultation, critical care, and remote monitoring (Cook, 2009). Since 2004, Kansas has had an increasingly active HIT/HIE community. In 2004, Kansas Governor Sebelius had the foresight to begin commission work towards the process of designing, selecting, and implementing a state-wide electronic health record system, the progression of which follows; the Governor's Healthcare Cost Containment Commission (H4C), 2004; Kansas Health Information Technology/Health Information Exchange Policy Initiative, 2005; Health Information Security and Privacy Collaboration (HISPC), 2007; Kansas HIE Commission, 2007; and the E-health Advisory Board, 2008. The E-health Advisory Board will make recommendations for the stimulus funding from

the American Recovery and Reinvestment Act (ARRA), 2009, currently releasing \$19.2 billion, nationwide, as financial incentives for HIT implementation and interoperability to be in place nationwide by 2014. The availability of these funds suggests that the smaller, less profitable hospitals may have the opportunity and financial viability to develop and put into place, EHR systems. Kansas is receiving, \$1,313,580,000 of stimulus funding (American Recovery and Reinvestment Act, 2009). In addition, Medicare and Medicaid reimbursements incentives will be given to hospitals who participate in an HIE.

The Kansas Hospital Authority (KHA) has voiced its concern regarding the speed at which President Obama has suggested that the EHR should be implemented. Correspondence from Thomas Bell, President and CEO of KHA, to David Blumenthal, National Coordinator for Health Information Technology, revealed Bell's concerns regarding the speed with which the federal government will require adoption of EHRs by Critical Access Hospitals within Kansas. Bell focused on the fact that, in general, Kansas has a relatively larger rural population, with hospitals that are much smaller than the national average. Bell's concerns included the limited financial capabilities of Kansas hospitals, limited capabilities of vendors to serve rural areas, and the inability to recruit and retain an adequate number of trained IT staff (Bell, 2009).

Research question 2a, "From the perspective of the Chief Nursing Officer, if the EHR is in the process of implementation or has been successfully implemented, how does the EHR support nursing practice?" This query contains multiple questions within the category of usefulness and reflects Davis' (1989) theoretical tenet of "perceived usefulness" in Technology Acceptance Theory. The largest percentage (84.7%) of respondents chose "The EHR system improves information retrieval" followed by "The

EHR system improves access to information” (73.1%). These two questions are closely related and speak to the usefulness of the EHR system to the respondent’s work, supporting Technology Acceptance Theory, that technology users will use technology more readily if it is useful in their work.

Several reports published by the IOM (2000, 2001, 2004) call for increased use of HIT to improve patient outcomes and nursing work environments. When nursing increases use of technology, such as an EHR system, patient care is improved due to the increase in information flow and knowledge capture within the working environment, (Ammenworth et al., 2003; Kossman & Scheidenhelm, 2008; Moody et al., 2004; Poissant et al., 2005). Of the respondents, 69.2% agreed with the questions that are closely aligned with usefulness; “The EHR provides greater accuracy of patient data”; “The use of the EHR makes patient care safer”; “There is less patient care error with use of the EHR system”. These questions and responses are supported by the IOM’s *Crossing the Quality Chasm* (2001) report which stated the focus of care for nurses and clinicians should be to provide safe, effective, patient-centered, timely, equitable care. “Feeling disconnected if the computer goes down”, “using the computer to research diagnoses and evidence-based practice”, and becoming a “more informed, patient-centered” healthcare provider are important to a great extent to the respondents (65.4%-50.0%) and may suggest an increasing reliance on computer technology for information. In response to the question, “Does the EHR system save nursing staff time”, 33.3% of the respondents did not believe the EHR saved time. This is a relatively large number, due in part, to the time it may take for nurses not familiar with technology to feel comfortable with any IT system (Alpay & Russel 2002; Ammenworth et al, 2003; Kirkley & Stein, 2004). These

queries in research question two support Davis' (1989) Technology Acceptance Theory and reflect contentions contained in the IOM's Quality Initiative Series namely support of patient safety and quality care through the use of health information technology by persons who are most often at the point of care, the nurse.

One hundred percent of the respondents believed that the EHR did not "limit nurse's critical thinking skills"; and 96% believed that "care was not less personalized". Regarding the "waste of staff's time" and "favoring efficiency over accuracy"; 92.4% did not believe the EHR system promoted this. These results suggest that the respondents understood that EHR systems do create a better working environment for nursing and not at the expense of obviating critical thinking skills. These results also point to a broader understanding of the capabilities of an EHR system that is, that the EHR system can provide nursing with the ability to access scientifically based nursing practice that is solidly grounded in evidence. Quicker and more accurate information made available to nurses, allows for the creation of a safer, more efficient environment and promotes positive outcomes for health providers and their patients. The results from question two are a reflection of the stipulations in the literature regarding nursing care and the capabilities of an EHR system (Aiken et al., 2002; Dienemann & Van de Castle, 2003; Page, 2004).

Research question 2b, "What are the nurse's role in implementing the EHR" revealed that 80% of the respondents stated that the Board of Directors of their hospital advocated for the EHR system, however, 73.1% of the CNOs reported that they formed the EHR implementation committee, and 69.2% were either appointed to or chose to be on an implementation committee.

The remainder of research question 2b reported that greater than 50% of the respondents (n=26) participated in training of staff, advocated for the EHR system, worked with vendors, or was a member of an implementation committee. Only 12% of the respondents reported peripheral involvement with implementing an EHR system. Together these results suggest a deep commitment by these respondents to the success of the implementation of an EHR system. It suggests an understanding of the importance of HIT as a means to improve patient care, patient outcomes, and the nurses' work environment. Developing reciprocity and creating an atmosphere of trust through facilitation of action builds social capital (Coleman, 1988). By developing committees, becoming a member or volunteering to serve, respondents were building alliances through exchange of information from internal to external networks.

Value is added to a person through the quality of information and connection that they build with others and creates an advantage for that person (Burt, 2005). The respondents in this study, by their involvement in the creation and implementation of their EHRs, were in the process of building bonds with leaders linking power differentials. This bridging, bonding, and linking can prove to be a means of building social capital that wields both power and influence (Portes, 1998; Putnam, 2000; Szreter & Woolcock, 2004). Nursing can use this power and influence by building social capital and collective power. Promoting mutual trust, reciprocity, and providing new information and perspective to disparate groups adds value to nursing. This value or power and influence can assist nursing towards transforming the workability of their environment, creating a more useful, usable, safer workplace. Nurses working together to achieve common goals improves the well-being of patients (Page, 2004).

Research question 2c, “What were the factors that led to the implementation of the EHR by the nursing staff.” One hundred percent (n=26) of the respondents reported that they have a trusting relationship with nursing staff, managers and directors, hospital administration, and generally feel most people are trying to be helpful. In general, the results of this question are quite positive. Respondents feel comfortable with technology (96.2%), feel powerful in their profession, feel that most people can be trusted (96%), and that staff could freely ask questions (95.7%). Ninety-two percent received support and encouragement from managers, directors, and (91.3%) were encouraged to learn from others. Eighty percent of the respondents said that their EHR system was useful and easy to use reflecting the two major concepts of “perceived usefulness” and “perceived ease of use” in Davis’ Technology Acceptance Theory (1989).

Seventy percent of the respondents felt the staff were part of the implementation team, and received enough training and support from the IT staff. These are powerful results and again suggest the utilization of social capital by the respondents. At its most basic, Social Capital Theory contends that building a network of trust, reciprocity, and good will, will facilitate collective action (Coleman, 1988.) Furthermore, committing time and energy to the actions of building good will, results in positive returns within the network (Lin, 2005). These returns may provide accumulation of power and influence (Portes, 1998; Putnam, 2000; Szreter & Woolcock, 2004).

Benner (2001), however, stated the persistence of nursing’s invisibility and perceived lack of value decreases their power. Benner’s contention speaks to the importance of documenting nurse’s work and making this work visible and quantifiable. Implementation of an EHR that is usable, and contains the means, by which nurse’s work

is documented and validated, can promote nurses' visibility. The IOM emphatically declared that nurses are indispensable to patient safety and acknowledged that power is necessary to influence a group (Page, 2004).

Nurses have the ability to influence others through possession of skills and knowledge that are useful to others (Kubsch, 1996). Chandler (1992) asserted that power arises from relationships and is not merely rationed out from having control, authority, or influence. Social Capital Theory concepts reinforce this sharing of power; it is only through relationships, trust, goodwill, and reciprocity that social capital and power is built. Nurses can recognize power in social structures and develop the ability to exert power over their environment in order to make the optimum contribution to the patient's care (Manojlovich, 2007). The respondents in this study reported that they believed the nursing staff had trusting relationships with vendors, managers, and hospital administration. They also reported staff being involved in implementation of, and participation in, EHR committees. This involvement may translate into the ability to create an EHR that becomes a superior tool to support, quantify, and validate nurse's work.

The respondents in question 2c, believing that the EHR would benefit the nurse's working environment and provide increased patient safety and quality of care, have provided responses that reflect a realization of the importance of their individual participation in networks outside their immediate domain. The responses reflect a willingness to become involved in creating outcomes that influence the working environment of nurses and the quality of care for their patient population. The fact that 100% of the respondents reported that they had a trusting relationship with managers,

administration, and staff; 96% felt most people could be trusted; 92% of the respondents felt they received support from managers and directors and 92% felt powerful in their position speaks to the fact that these particular respondents have been utilizing the concepts of social capital building in their work environment. These results, coupled with the results of question three, that 69.6%-73.2% were involved in some aspect of the implementation of their EHR system, suggests knowledge of the importance of reciprocity, mutual trust, and collective action, namely the importance of social capital.

Research question 3, what is the relationship between perceived social capital and the implementation of the EHR revealed no correlation. Correlations were computed using Spearman's rho among the variables. Spearman's rho can be used when the data is independent but not normally distributed, the sample size is less than 100, and "the measurement scales underlying the variables are ordinal i.e., the values for the variable indicate their position in relation to each other, but the intervals between scores lack quantitative meaning" (Green & Salkind, 2005, p. 261) and when categories are collapsed.

Multiple reasons exist for not finding any correlation among the variables of EHR implementation and perceived social capital. The influence of a moderating variable that was not identified could have altered the ability to find a correlation. The respondents may not have fully understood the concepts of social capital; social capital is a relatively new concept that has only been recently identified as having an impact on nursing (Hofmeyer & Marck, 2008). Familiarity with this concept may exist more readily in the academic population. Marchibroda (2007b) first referred to social capital as a means to create a safer health care system and as such the familiarity of the concept may not be

seen as relevant to consultants outside academia. Although the results of the survey are kept anonymous, respondents may have overestimated or underestimated their perceived social capital for various personal or professional reasons and this may have skewed the results. The survey itself may be flawed and may not have identified the aspects of social capital that would enhance EHR implementation for this particular population.

Social capital has multiple definitions and this may be a primary reason it is hard to measure and quantify. There is also debate regarding whether social capital can be measured in an aggregate form since it is generally surveyed and quantified using individual's perceptions of their social capital. In general, indicators of social capital are group membership, trust, reciprocity, membership in formal and informal social networks, and civic engagement. Multiple studies have detailed various aspects of social capital possessed by different groups in the United States. Putnam's (2000) seminal work on social capital in the U. S. stated that better health and improved longevity were correlated to the possession of social capital. He also reported that participation and membership in civic organizations, politics, religious organizations, trade unions, and professional organizations has declined and "by every conceivable measure, social capital has steadily eroded . . . over the past two generations" (p. 287). Harper (2001) disagreed with Putnam and contended that participation has increased in self-help groups, such as Alcoholics Anonymous as well as in evangelical churches and para-church memberships. However, she contended that this may be due to the fact that within these organizations, less is required by the member to actively participate; the common tie being the ideal or symbol, not the relationship or the activity by the member within the community.

Erickson (2005) argued that the network variety of social capital may be job specific yielding greater employee productivity and stated that the “effect of social capital on income is about as strong as the effect on education, prior industry experience, or tenure in ones’ current job” (p. 153). Lin (1999) as well as Polodny and Baron (1997) studied the positive effects social capital has on the career mobility within organizations. Coleman (1988) contended that social capital is related to better educational achievement. Bowman and Flap (2005) stated that social capital is more important later on in a person’s career when the individual has built a larger network and possesses a certain amount of experience. Hurlbert, Beggs, and Haines (2005) studied social capital in an extreme environment and contended that social networks, social capital, social resources and their interrelation available to people, may be valuable in one environment and useless in another. Cohen and Prusak (2001) reviewed multiple studies within multiple organizations in their book, *In Good Company*, and concluded that social capital is a concept “many may know, but that it is often undervalued, misunderstood, and often hidden” (p. 25).

CNO’s perception of their social capital in this study was generally high. They felt powerful in their profession, interacted on multiple levels with staff and administrators within their organizations, belonged to professional organizations, and felt a sense of trust with others with whom they interacted. Noted in the responses to the survey was a lack of membership in civic organizations. The majority of social capital theorists contend that membership in civic organizations and community involvement is essential to the possession of social capital. Social capital theorists state that measuring

an individual's social capital may not aggregate to reflect the social capital of an organization; this may be applicable in this study.

Recommendations for Practice and Policy Making

Safety, quality, efficient, equitable health care is the goal of the healthcare provider in the United States (National Coalition on Health Care, 2010). The IOM has stated that this is not possible with the disjointed, fragmented, unfair system that is in currently in place. The IOM recommended a general reconfiguration of the United States healthcare system that includes, but is not limited to, interoperable electronic medical records, further education for health care providers, and patient centered care. There is now a body of research attesting to the importance of HIT implementation suggesting that transforming a paper-based system to IT will create a safer environment (Aspden, Corrigan, Wolcott, & Erickson, 2004; Institute of Medicine, 2001b; Greiner & Knebel, 2003; Page, 2004; Kohn, Corrigan & Donaldson, 2000). HIT implementation teams with nursing leaders, need to be cognizant of how and why nursing staff use and embrace new technology in order to gain a smooth transition to implementation and user acceptance. Technology Acceptance Theory addresses user's intentions with regard to the perceived usability and ease of use with technology that is required by an end-user. A nursing leader's knowledge of how these concepts affect their staff can provide knowledge of how to proceed with the easiest and most expeditious route to implementation of any technological change.

The importance of comprehension of Social Capital and Social Network Theory by nurses cannot be underestimated. As noted in Chapter Four, fewer respondents (N=42) answered the questions aimed at determining their perceived amount of social capital.

One respondent queried, “What is the relevance of this section of who I know to IT implementation?” and did not fill out the remaining questions. This may be a common question among nurses, not often asked out loud. Having knowledge of the importance of developing social capital in the 21st century is essential for achieving individual or collective goals. During the past two decades, sociologists have begun to closely study social networking and the importance of creating social capital in the workplace. Accomplishments are now beginning to be achieved by consensus and leadership is achieved by engaging multiple interdisciplinary forces. Power and influence are garnered through use of ‘networking’. Social capital can be seen as contained within the resources of social networks. A person who develops social capital can facilitate the flow of new information and exert influence on pivotal people who may contain valuable resources (Lin, 2005). Within groups, social capital can be understood to represent an “aggregation of valued resources such as economic, political, cultural and social, as in social connections” (Lin, p. 9).

Nurses have been in disagreement across multiple fronts regarding their practice; what should be the minimum academic degree entry into practice; what type of care should be delivered in the hospital; what is the appropriate nurse to patient ratio (Barter, 2001; Boyce, Brow, Cote, et al., 2001). Nurses also now operate in an increasingly divided and complex health care environment; an environment where patients are sicker and care is more complex (Boyce, et al.). Care is also fragmented and pigeon-holed, from patient groups in very large institutions, to individuals in home care (Page, 2004).

Creating social capital and engaging in social networking in and among the nursing profession should not be viewed as an inconsequential, trivial pursuit. Social

capital development is a legitimate component of improving nursing's power and influence within the health professions. The creation of social capital enables that profession to add value to itself by gaining access to information and resources that enable them to achieve definable goals (Burt, 2005; Hofmeyer & Marck, 2008; Portes, 1998). The functional knowledge of social networks and social capital is now an essential part of a nurse's education.

Limitations of this Study

This study was limited by the response rate of the participants. The number of surveys completed was 26. Research studies consider valid only those surveys wherein every question is answered. This was a study describing the aspects of the implementation of an EHR at different stages; therefore responses were considered valid if not all questions were answered regarding queries that were not applicable to all respondent's stages of implementation.

Further limitations include the unfamiliarity of the concept of social capital by the respondents. The assumption was that the definition of the concept provided at the beginning of the survey would provide sufficient explanation to the CNO so that application could be made within the context of their practice. This may not have been the case, considering the response of a participant stating "what is the relevance of who I know to IT implementation?"

This study was descriptive in nature regarding the EHR implementation in Kansas; therefore the ability to generalize is limited to the State of Kansas and should not be considered applicable to any other setting.

Recommendations for Further Research

This study focused on the population of Chief Nursing Officers whose hospitals were members of the Kansas Hospital Association. The results revealed a population who are very knowledgeable regarding the effects EHR implementation has on the nursing work environment and patient care. Further studies need to be conducted quantifying nurse involvement with EHR implementation. Studies are needed to assess the impact of the EHRs on patient outcomes and patient perceptions of the EHR. Studies are also needed to explore the correlation between implementation of the EHR and the influence of gender, age, socioeconomic status, hospital size, previous IT knowledge, or cultural differences in the implementation of EHRs. Knowledge of these influences on implementation would allow a nurse educator or nurse informaticist to identify appropriate teaching models or methods with which to approach teaching the use of new technology.

Studies can occur before an EHR system is implemented and staff are trained. With this baseline, a study could be completed to identify staff adoption of a new EHR. The variables could be as simple as staff not wanting to learn something new or whether there was a previous application of an IT system that failed and staff have become resistant to trial and change.

This study provides a baseline so that power can be calculated for future studies. The standard procedure for sociological studies is to have 80% power and a medium effect size.

With regard to measuring social capital as a quantifiable source, studies should be developed to determine the quality of those relationships and ascribe a value to those

relationships. Also because social capital may be derived from sources outside of the occupation sources; a study might include identification of those exterior sources and their importance. An effort should be made to define how various clues of trust, good will, and reciprocity are identified to determine what a network relationship could provide in terms of ascertaining a goal.

Summary

Since pervasive problems with the quality and safety of patient care in the United States was documented with the publication of *To Err Is Human* (2000), the American public, private enterprise, government agencies, policy-makers, and academic institutions, have struggled with how to transform this system into one that is safe, secure, and efficient. The Institute of Medicine (IOM) has recommended Health Information Technology (HIT) become an integral component in improving the delivery of health care stating emphatically that the implementation of HIT will save thousands of lives as well as billions of dollars in unnecessary costs.

This study's purpose was to identify Electronic Health Record (EHR) implementation in Kansas, describe the components of the EHR, the role of nursing in the implementation and support of the EHR, and how the Chief Nursing Officer's (CNO's) perception of social capital may correlate with implementation of the EHR. A survey was developed to gather data with which to quantify the components of individual hospital's EHRs and to quantify the current state of implementation; to describe the CNO's perceptions and roles in the implementation of the EHR, and to examine if any correlation existed between their perceived social capital and EHR implementation.

The study revealed that the CNOs who responded to the survey were deeply aware of the importance of the EHR in promoting the best possible practice for nursing and in the EHR's potential to secure the best possible outcome for their patient population. Nurses have been the invisible glue, the persons most often at the bedside providing care that has not always been acknowledged. Since Nightingale identified the importance of quality nursing care and the need to analyze patient outcomes in the late 1800s, nursing has struggled to make visible their contributions to quality care. The EHR provides a means to identify what nurses do. It allows nursing to gather and store quality data and information regarding patient care outcomes, while providing multiple disciplines data for best practices analyses (Bakken, Cimino, & Hripcsak, 2004).

Many hospitals in this study had in place EHRs that were extensive and offered a wide range and variety of services to health care providers and patients. The IOM has repeatedly called for a total transformation in how health care is delivered in the United States. Kansas, because of its decade's long involvement in developing and nurturing HIT, may be further along in achieving the goal of the transformation to inter-operative health care records than most regions in the United States.

The results of this study revealed that for this population of CNOs, possessing social capital may be a reality to them. They stated they felt powerful in their profession and were active in their hospital's EHR implementation team. They felt that most people could be trusted and that they worked in an environment where trust among colleagues was a reality. Social capital exists because of the existence of trust and good will shared among people. Marchibroda (2007b) urged the formation of social and human capital, beginning at the local level, to create a community of good will, trust, and reciprocity

where collaboration would enable competitors and disparate stakeholders to break down barriers and exchange health information. She urged that a “secure electronic health information exchange” (§ 3) be built from the ground up supported by federal incentives and rewards the use of HIT.

Nurses have long been an advocate for quality health care and have often been underestimated. Nurses in this study felt powerful in their profession and viewed health information technology as a means to promote safe, quality patient care. As the largest group of health caregivers in the United States and as the professionals most often at the point of care, nurses provide an essential link in the continuum of health care. Thomas (1985) stated that the invisible glue that holds hospitals together is the nurse; the IOM (2004) has contended that nurses play a critical role in patient care and are indispensable to patient safety. Will the 2.8 million nurses remain invisible? The invisibility of nurses has occurred as a result of many factors; cultural, societal, and gender-driven. However, nursing is now comprised of multiple disciplines with multifaceted individuals whose abilities are utilized in the creation and implementation of diverse health care environments. Nurses are altering their ‘invisible paradigm’ by actively participating in all facets of health care and by quantifying their contributions in multiple arenas including the use and development of electronic health records. The nursing profession continues to evolve to support the increasing complexity of health care and is poised to fully participate in what the IOM has termed, a complete overhaul of the United States health care system.

A new paradigm of health care is emerging. A complementary health care culture; that of medicine and nursing, not at odds with each other, but as a team-with an

appreciation and respect for the powerful contribution each makes towards the goal of quality patient care.

References

- Abdrbo, A. A., Hudak, C. A., Anthony, M. K., & Douglas, S. L. (2009). Moderating and mediating role of nurses' beliefs: Information systems use among Ohio nurses [Electronic Version]. *Western Journal of Nursing Research*, (31)1, 110-127.
- Abood, S. (2007, September 20). Influencing health care in the legislative arena. *OJIN: The Online Journal of Issues in Nursing*. Retrieved December 8, 2007, from www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Volume122007/No1Jan07/tpc32_216091.aspx, AHIC use cases extension/gaps.
- Aiken, L., Clark, S., Sochalski, J., & Silber, J. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction [Electronic version]. *Journal of the American Medical Association*, 288, 1987-1993.
- Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Alpay, L. & Russell, A. (2002) Information technology training primary care: The nurses' voice [Electronic Version]. *Computers, Informatics, Nursing*, 20(4), 136-142.
- American Health Information Management Association. (2005). *Survey sheds light on key regional health information organizations benefits and uses*. Retrieved October 12, 2008, from http://www.ahima.org/press/press_releases/05.1101.asp
- American National Standards Institute. (2008). ANSI. Retrieved January 2, 2009 from http://www.ansi.org/about_ansi/overview/overview.aspx?menuid=1
- American Nurses Association. (2008). *Nursing informatics: Scope and standards of practice*. Silver Springs, MD: Nursesbooks.org.
- American Recovery and Reinvestment Act. (2009). Retrieved February 14, 2010, from <http://www.recovery.gov/TRANSPARENCY/RECIPIENTREPORTEDDATA/Pages/statesummary.aspx?StateCode=KS>
- Ammenwerth, E., Mansmann, U., Iller, C., & Eichstadter, R. (2003). Factors affecting and affected by user acceptance of computer-based nursing documentation: Results of a two-year study [Electronic version]. *Journal of the American Medical Informatics Association*, 10(1), 69-84.

- Aspden, P., Corrigan, J. M., Wolcott, J. & Erickson, S. M. (Eds.). (2004). *Patient safety: Achieving a new standard of care*. Washington DC: National Academy Press. (Retrieved May 12, 2008, from http://books.nap.edu/openbook.php?record_id=10863&page=45)
- Bakken, S. (2006). Informatics for patient safety: A nursing research perspective. *Annual Review of Nursing Research*, 24, 219-254.
- Bakken, S., Cimino, J. J., & Hripcsak, G. (2004). Promoting patient safety and enabling evidence-based practice through informatics [Electronic version]. *Medical Care*, 42, II-49-II-56.
- Bakken, S., Cook, S., Curtis, L., Desjardins, K., Hyun, S., Jenkins, M. et al. (2004). Promoting patient safety through informatics based nursing education [Electronic version]. *International Journal of Medical Informatics*, 73, 581-589.
- Ball, M. (2005). Nursing informatics of tomorrow. *Healthcare Informatics 2*. Retrieved April 30, 2007, from http://www.healthcare-informatics.co...02_05/ball.htm.
- Ball, M. J., Weaver, C. & Abbott, P. A. (2003). Enabling technologies promise to revitalize the role of nursing in an era of patient safety. *International Journal of Medical Informatics*, 69(1), 29-38.
- Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Bani-Issa, W. (2005). Teaching beliefs and practices and the use of electronic health records in nursing education: A collective case study. Unpublished dissertation. Retrieved December 15, 2008, from <http://proquest.umi.com/pqdlink?did=982833261&Fmt=7&clientId=79356&RQT=309&VName=PQD>.
- Barter, M. & Lenihan, P. (2001). BSN by 2010: A California initiative [Electronic version]. *Journal of Nursing Administration*, 31(3) 141-144.
- Barton, A. J. (2005). Cultivating informatics competencies in a community of practice. *Nursing Administrative Quarterly*, 29(4), 323-328.
- Beall, F. (2007). Overview and summary: Power to influence patient care: Who holds the keys? *OJIN: The Online Journal of Issues in Nursing*. Retrieved December 8, 2007, from www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Volume122007/No1Jan07/tpc32_216091.aspx.

- Bell, T. L. (2002). Correspondence to David Blumenthal, Office of the National Coordinator for Health Information Technology. June 26, 2009. Retrieved January 3, 2010, from MeaningfulUse@hhs.gov
- Benner, P. (2001). *From novice to expert: Excellence and power in clinical nursing practice*. (Commemorative edition). Upper Saddle River, NJ: Prentice Hall Health.
- Blobel, B. (2004). Authorisation and access control for electronic health record systems [Electronic version] *International Journal of Medical Informatics*, 73, 251-257.
- Booth, R. G. (2006). Educating the future eHealth professional nurse. *International Journal of Nursing Education Scholarship*, 3(1). Retrieved December 20, 2008, from http://works.bepress.com/richard_booth/1.
- Boyce, C. A., Brow, M. B., Cote, K. C., DeSoto, M. C., Evans, P. A., Gorman, D. et al. (2001). End the debate: Entry level into practice should be the Master's degree [Electronic version]. *Journal of Nursing Administration*, 31(4), 166-168.
- Brailer, D. (2004). Office of the national coordinator for health information technology: Executive summary. Retrieved December 1, 2007, from <http://www.hhs.gov/healthit/executivesummary.html>.
- Brailer, D. (2005). Remarks by David Brailer, HIMSS, 2005. Retrieved March 13, 2008, from www.hhs.gov/healthit/BrailerSpch05.html.
- Burt, R. S. (1997). The contingent value of social capital. *Administrative Science Quarterly*, 42, 339-365.
- Burt, R. S. (2005). Structural holes versus network closure as social capital. In N. Lin, K. Cook, & R. Burt (Eds.), *Social capital: Theory and research* (pp. 31-56). New Brunswick, NJ: Aldine transactions.
- Bush, G. W. (1999). Remarks by the President. Rose garden, December 7, 1999. Retrieved December 5, 2007, from <http://www.ahrq.gov/wh120799.htm>.
- Bush, G. W. State of the Union. January 20, 2004. Retrieved December 6, 2007, from <http://www.whitehouse.gov/news/releases/2004/01/20040120-7.html>.
- Bush, G. W. (2004). Executive order: Incentives for the use of HIT and establishing the position of the national health information technology coordinator. April 2004. Retrieved December 6, 2004, from <http://www.whitehouse.gov/news/releases/2004/04/20040427-4.html>.

- Centers for Disease Control. (2007). Health, United States, 2007: With chartbook on trends in the health of Americans. Retrieved April 20, 2008, from <http://www.cdc.gov/nchs/data/hus/hus07.pdf>.
- Certification Commission for Healthcare Information technology. (2008). Certification commission. Retrieved January 2, 2009, from <http://www.cchit.org/about/index.asp>.
- Chandler, G.E. (1992). The source and process of empowerment. *Nursing Administration Quarterly*, 16(3), 65-71.
- Charter statement for the Kansas health policy authority health information advisory panel. (n.d.). Retrieved September 30, 2008, from <http://www.khpa.ks.gov/AuthorityBoard/Advisory%20Councils/EHealth/CharterStatement092008.pdf>.
- Chassen, M. R., Galvin, R. W. & The National Roundtable on Health Care Quality. (1998). The urgent need to improve health care quality. *Journal of the American Medical Association*, 280, 1000-1005.
- Chismar, W. G. & Wiley-Patton, S. (2002). Does the extended technology acceptance model apply to physicians. *Proceedings of the 36th Hawaii International Conference on Systems Sciences*.
- Cohen, D. & Prusak, L. (2001). *In good company: How social capital makes organizations work*. Boston: Harvard Business School Press.
- Coiera, E. (2003). *Guide to health informatics*. (2nd ed.). New York: Oxford University Press.
- Coiera, E. (2006). Communication systems in healthcare. *Clinical Biochemical Review*, 27, 89-98.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, S95-S120.
- Connors, H. Personal communication. May 28, 2008.
- Connors, H. R., Weaver, C., Warren, J., & Miller, K. L. (2002). An academic-business partnership for advancing clinical informatics. *Nursing Education Perspectives*, 23(5). 228-233.
- Connors, H., Warren, J., & Weaver, C. (2007). The perfect storm: Ratios, retirement, and entry into practice. *Nursing Administration Quarterly*, 31(2), 129-133.

- Cook, C., Health, F., & Thompson, R. L. (2000). A meta-analysis of response rates in web-or internet-based surveys. *Educational and Psychological Measurement*, 60(6), 821-836.
- Cook, D. J. (2009). *E-health advisory council update* [PowerPoint]. Retrieved February 14, 2010, from <http://www.khpa.ks.gov/hite/download/KHPAPresentation.pdf>
- Courey, T., Benson-Soros, J., Deemer, K., & Zeller, R. A. (2006). The missing link: Information literacy and evidence based practice as a new challenge for nurse educators. *Nursing Education Perspectives*, 27(6), 320-323.
- Courtney, K. L., Demiris, G., & Alexander, G. L. (2005). Information technology: Changing nursing processes at the point-of-care. *Nursing Administration Quarterly*, 29(4), 315-322.
- Creswell, J. W. (2004). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Davis, F. D. (1989). Perceived usefulness, ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-339.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003.
- Dienemann, J., & Van de Castle, B. (2003). The impact of health care informatics on the Organization [Electronic version]. *Journal of Nursing Administration*, 33(11), 557-562.
- Dillman, D. A. (2007). *Mail and Internet surveys: The tailored design method* (2nd ed.) Hoboken, NJ: John Wiley & Sons, Inc.
- Dillon, T. W., Blankenship, R., & Crews, T. (2005). Nursing attitudes and images of electronic patient records [Electronic version]. *Computers, Informatics, Nursing*, 23(3), 139-145.
- Dillon, T. W., McDowell, D., Salimian, F., & Conklin, D. (1998). Perceived ease of use and usefulness of bedside-computer systems [Electronic version]. *Computers in Nursing*, 16(3), 151-156.
- Dixon, D. (1999). The behavioral side of information technology. *International Journal of Medical Informatics*, 56(1), 117-123.
- Duff, L. & Casey, A. (1998). Implementing clinical guidelines: How can informatics help? [Electronic version]. *Journal of American Medical Informatics*, (5), 225-226.

- Dulong, D. & Gassert, C. (2008). TIGER: TIGER phase 2: Achieving the vision [Electronic version]. *Computers, Informatics, Nursing*, 26(10), 59-61.
- Elo, S. & Kyngäsh, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107-115.
- Englehardt, S. P. & Nelson, R. (Eds.). (2002). *Health care informatics: An interdisciplinary approach*. St. Louis: Mosby.
- Erickson, B. H. (2004). A report on measuring the social capital in weak ties. Retrieved February 27, 2009, from www.recherchepolitique.gc.ca/doclib/Erickson_0604_2004.pdf.
- Erickson, B. H. (2005). Good networks and good jobs: The value of social capital to employers and employees. In N. Lin, K. Cook, & R. S. Burt (Eds). *Social capital: Theory and research*. New Brunswick, NJ: Aldine Transaction.
- Executive Order 07-02. (2007). Retrieved September 30, 2008, from http://www.governor.ks.gov/executive/orders/exec_order0702.htm.
- Fink, A. & Kosecoff, J. (1998). *How to conduct surveys: A step-by-step guide*. Thousand Oaks, CA: Sage Publications.
- Fishbein, F. M. & Ajzen, I. (1975). *Belief, attitude, intentions and behavior: An introduction to theory and research*. Reading MA: Addison-Wesley.
- Flap, H. & Boxman, E. (2005). Getting started: The influence of social capital on the start of the occupational career. In N. Lin, K. Cook, & R. S. Burt (Eds). *Social capital: Theory and research*. New Brunswick, NJ: Aldine Transaction.
- Fowler, F. J. (1984). *Survey research methods*. Beverly Hills, CA: SAGE Publications.
- Fowler, F. J. (2009). *Survey research methods*. Thousand Oaks, CA: SAGE Publications, Inc.
- Gefen, D. & Straub, D. W. (1997). Gender differences in the perception and use of E-mail: An extension to the technology acceptance model [Electronic version]. *MIS Quarterly*, 21(4), 389-400.
- Granovetter, M. S. (1973). The strength of weak ties. *The American Journal of Sociology*, 78(6), 1360-1380.
- Graves, J. R. & Corcoran, S. (1989). The study of nursing informatics. *Image: Journal of Nursing Scholarship*, 21, 227-231.

- Green, S. B. & Salkind, N. J. (2005). *Using SPSS for Windows and Macintosh: Analyzing and understanding data*. (4th ed). Upper Saddle River, NJ: Pearson Prentice Hall.
- Greiner, A. C., & Knebel, E. (Eds.). (2003). *Health professions education: A bridge to quality*. Washington DC: The National Academy Press.
- Harper, R. (2001). Social capital: A review of the literature. Social analysis and reporting divisions Office of National Statistics, United Kingdom. Retrieved April 16, 2010, from www.statistics.gov.uk/socialcapital/downloads/soccaplitreview.pdf
- Health Information, Security, and Privacy Collaboration (HISPC). (2007). Retrieved February 18, 2008, from www.rti.org/hispc.
- Health Information Management Systems Society. (2004). The McKesson Corporation. Patient safety and nursing: transforming the work environment with technology. Retrieved March 20, 2008, from http://www.himss.org/content/files/Nursing_Informatics_Toolkit/White%20paper/McKesson%20Nursing%20Pt%20Safety%20Paper.pdf.
- Health Information Management Systems Society. Nursing Informatics Awareness Task force. *Nursing Management* March 2007. Retrieved May 12, 2008, from <http://www.himss.org/handouts/694inform0307p38.pdf>.
- Hendrickson, A. R., Massey, P. D., & Cronan, T. P. (1993). On the test-retest reliability of perceived usefulness and perceived ease of use scales. *MIS Quarterly*, 17(2), 227-230.
- Hersh, W. (2006). Who are the informaticians? What we know and should know [Electronic version]. *Journal of the American Medical Informatics Association*, 13, 166-170.
- Hobbs, S. D. (2002). Measuring nurses' computer competency: An analysis of published instruments. *Computers, Informatics, Nursing*, 20(2), 63-73.
- Hofmeyer, A. & Marck, P. B. (2008). Building social capital in healthcare organizations: Thinking ecologically for safer care. *Nursing Outlook*, 56(4), 145-151.
- Hurlbert, J. S., Beggs, J. J., & Haines, V. A. (2005) Social networks and social capital in extreme environments. In N. Lin, K. Cook, & R. S. Burt (Eds). *Social capital: Theory and research*. New Brunswick, NJ: Aldine Transaction.
- Imhoff, M., Webb, A., & Goldschmidt, A. (2001). *Health Informatics*. In Staggers, N. & Thompson, C. B. (2002). The evolution of definitions for nursing informatics: A critical analysis and revised definition [Electronic Version]. *Journal of the American Medical Informatics Association*, 9(3), 255-261.

- Institute of Medicine (2003). Committee on data standards for patient safety. *Key capabilities of an electronic health care record*. Washington DC: The National Academies Press.
- Institute of Medicine. (1991). *The computer-based record: An essential technology for patient care*. Washington DC: National Academy Press.
- Institute of Medicine. (2001a). *Executive summary*. Retrieved June 3, 2005, from <http://www.nap.edu/openbook/0309087236/gifmid/2.gif>.
- Institute of Medicine. (2001b). *Crossing the quality chasm: A new health system for the 21st century*. Retrieved December 3, 2005, from <http://www.iom.edu/report.asp?id=5432>.
- Institute of Medicine. (2000). *To err is human: Building a safer health care system*. Retrieved December 2, 2005, from <http://www.iom.edu/report.asp?id=5575>.
- Institute of Medicine. (2009). *Crossing the Quality Chasm: The IOM health care quality initiative*. Retrieved April 2, 2009, from <http://www.iom.edu/CMS/8089.aspx>.
- Jha, A. K., DesRoches, C. M., Campbell, E. G., Donelan, K. et al. (2009, April). Use of electronic health records in the U. S. hospitals [Electronic version]. *New England Journal of Medicine*, 360, 1628-1638.
- Joint Commission on Accreditation of Healthcare Organizations (n.d.). Health care at the crossroads: Strategies for addressing the evolving nursing crisis. Retrieved June 13, 2008, from http://www.jointcommission.org/NR/rdonlyres/5C138711-ED76-4D6F-909F-B06E0309F36D/0/health_care_at_the_crossroads.pdf.
- Kansas E-health Advisory Council. (2010). Retrieved February 19, 2010, from http://www.khpa.ks.gov/advisory_council/e_council/default.htm
- Kansas Health Care Cost Containment Commission. (2007). Retrieved December 20, 2008, from <http://www.khi.org/s/index.cfm?aid=152> .
- Kansas Health Information Technology/Health Information Exchange Initiative 2007. Retrieved February 16, 2008, from <http://www.khpa.ks.gov/QandI/Docs/Final%20State%20of%20Kansas%20Report.pdf>.
- Kansas Health Policy Authority. (2005). Retrieved December 20, 2008, from <http://www.khpa.ks.gov>.

- Kansas Hospital Association. (2009). Annual stat report Kansas hospital association, 2009. Retrieved January 23, 2010, from http://www.kha-net.org/Communications/AnnualSTATReport/Downloads_GetFile.aspx?id=54648
- Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs [Electronic version]. *MIS Quarterly*, 23(2), 183-213.
- Kausal, R., Shojania, K. G., & Bates, D. W. (2003). Effects of CPOE and clinical decision support systems on medication safety: A systematic review. *Archives of Internal Medicine*, 163, 1409-1416.
- Kirkley, D. (2004). Gaining buy-in for computerized clinical processes: Not whether but when. *The Journal of Nursing Administration*, 34(2), 55-58.
- Kirkley, D. & Stein, M. (2004). Nurses and clinical technology: Sources of resistance and strategies for acceptance. *Nursing Economics*, 22(4), 216-222.
- Kohn, L., Corrigan, J., & Donaldson, M. (Eds.). (2000). *To Err is human: Building a safer health system*. Washington DC: National Academy Press.
- Kossmann, S. P. & Scheidenhelm, S. L. (2008). Nurses' perceptions of the impact of electronic health records on work and patient outcomes [Electronic version]. *Computer, Informatics, Nursing*, 26(2), 69-77.
- Kubsch, S. M. (1996). Conflict, enactment, empowerment: Conditions of independent therapeutic nursing interventions. *Journal of Advanced Nursing*, 33(4), 209-215.
- Laschinger, H. K. S. & Leiter, M. P. (2006). The impact of nursing work environments on patient safety outcomes: The mediating role of burnout engagement. *Journal of Nursing Administration*, 36(5), 259-267.
- Leape, L. L., Bates, D. W., Cullen, D. J., Cooper, J., Demonaco, H. J., Gallivan, T., et al. (1995). Systems analysis of adverse drug effects. *Journal of the American Medical Association*, 274(1), 35-43.
- Leavitt, M. (2005). Secretary of Health and Human services Mike Leavitt. Retrieved June 14, 2006, from <http://www.niehs.nih.gov/news/events/pastmtg/2005/esoay/docs/MichaelLeavitt.pdf>.
- Lee, T. T. (2004). Nurses' adoption of technology: Application of Rogers' innovation-diffusion model. *Applied Nursing Research*, 17(4), 231-238.

- Lesser, E. & Prusak, L. (1999). White paper: Communities of practice, social capital, and organizational knowledge. IBM Institute for Knowledge Management.
- Lin, N. (2005). Building a network theory of social capital. In N. Lin, K. Cook, & R. S. Burt. (Eds.). *Social capital: Theory and research*. New Brunswick, NJ: Aldine Transaction.
- Lin, N. (1999). Social networks and status attainment. *Annual Review of Sociology*, 25, 467-487.
- Lin, N. & Dumin, M. (1986). Access to occupations through social ties. *Social Networks*, 8, 365-385.
- Lin, N., Fu, Y., & Hsung, R. (2005). The Position generator: Measurement techniques for investigations of social capital. In N. Lin, K. Cook, & R. S. Burt. (Eds.). *Social capital: Theory and research*. New Brunswick, NJ: Aldine Transaction.
- Linder, J. A., Schnipper, J. L., Tsurikova, R., Melnikas, A. J., Volk, L. A., & Middleton, B. (2006). Barriers to electronic health record use during patient visits. *AMIA Symposium Proceedings* 499-503.
- Lorenzi, N. M. (2003). *Strategies for creating successful local health infrastructure initiatives*. Vanderbilt University 03EASPE00772. Retrieved May 2, 2006, from <http://www.regionalinformatics.org/pdffdocs/Lorenzi-LHII.pdf>.
- Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, 35(6), 382-385.
- Malhotra, Y. & Galletta, D. F. (1999). Extending the technology acceptance model to account for social influence: Theoretical bases and empirical validation. Proceedings of the 32d Hawaii International Conference on System Sciences.
- Manojlovich, M. (2005). Power and empowerment in nursing: Looking backward to inform the future. *The Online Journal of Issues in Nursing* 12(1). Retrieved December 8, 2007, from <http://www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContent/Volume12Issue>.
- Marchibroda, J. M. (2007a). Reported by C. Conway. Breakthrough health information exchange research and sustainability tools released by eHealth initiative foundation. Retrieved June 5, 2007, from <http://www.ehealthinitiative.org/news/2007-06-05.msp>.
- Marchibroda, J. M. (2007b). Connecting America's communities requires social capital and changes in how we pay for healthcare. *MedGenMed*, 9(4), 10.

- Mason, D. J. (2008). *Transforming healthcare for patient safety: Nurses' moral imperative to lead*. Retrieved September 30, 2008, from <http://www.ahrq.gov/qual/nurseshdbk/nurseshdbk.pdf>.
- Mathieson, K. (1991). Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research*, 2(3), 173-191.
- McNeil, B. J., Elfrink, V., Beyea, S. C., Pierce, S. T., & Bickford, C. (2003). Computer literacy study: Report of qualitative findings. *Journal of Professional Nursing*, 22, 52-59.
- Mitchell, P. H. (2008). Defining patient safety and quality care. Retrieved September 30, 2008, from <http://www.ahrq.gov/qual/nurseshdbk/nurseshdbk.pdf>.
- Moody, L. E., Slocumb, E., Berg, B., & Jackson, D. (2004). Electronic health records documentation in nursing: Nurses' perceptions, attitudes, and preferences [Electronic version]. *Computer, Informatics, Nursing*, 22(6), 337-344.
- Nahapiet, J. & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23(2), 242-266.
- Nakao, K. & Treas, J. (1994). Updating occupational prestige and socioeconomic scores: How the new measures measure up. *Sociological Methodology*, 24, 1-72.
- National Coalition on Health Care. (2010). Retrieved March 27, 2010 from <http://nchc.org/about-us>
- National Committee on Vital and Health Statistics. *Information for health: A strategy for building the national health information infrastructure*. November 2, 2001. Retrieved December 6, 2007, from <http://www.ncvhs.hhs.gov/nhiilayo.pdf>.
- National Health Information Infrastructure (n. d.) Retrieved December 16, 2007, from <http://aspe.hhs.gov/sp/nhii/index.html>.
- National Health Information Network. (2007). Nationwide health information network: Scope of activities. Retrieved June 1, 2008, from www.hhs.gov/healthit/healthnetwork/background.
- Nielson, J. (2003). *Usability 101: Introduction to usability*. Retrieved June 1, 2006, from <http://www.useit.com/alertbox/20030825.html>.
- Nightingale, F. (1860). Notes on Nursing. What it is and what it is not. Retrieved January 3, 2009, from <http://digital.library.upenn.edu/women/nightengale/nursing/nursing.html>.

- Notes, (2006). Wambach, K. & Boyle, D. Measurement I and Measurement II. Doctoral coursework KUMC.
- Obama, B. H. (2009). Remarks by the President regarding the economic stimulus package. January 23, 2009.
- Office of the National Coordinator. (2007). Office of the national coordinator: Mission. Retrieved September 16, 2008, from <http://www.hhs.gov/healthit/onc/mission>.
- Page, A. (2004). (Ed.). *Keeping patients safe*. Washington DC: The National Academy Press.
- Patterson, P. K., Blehm, R., Foster, J., Fuglee, K. & Moore, J. (1995). Nurse information needs for efficient care continuity across patient units. *Journal of Nursing Administration*, 25, 28-36.
- Pearce, N. & Smith, G. D. (2003). Rekindling health care reform: Is social capital the key to inequality in health? *American Journal of Public Health*, 93(1), 122-129.
- Poissant, L., Pereira, J., Tamblyn, R. & Kawasumi, Y. (2005). The impact of electronic health records on time efficiency of physicians and nurses: A systematic review. *Journal of American Medical Informatics*, 12(5), 505-516.
- Polit, D. F. & Hungler, B. P. (1995). *Nursing research: Principles and methods*. (6th ed.). Philadelphia: Lippincott Publications.
- Polit, D. F., Beck, C. T., & Owen, S. V. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing and Health*, 30, 459-467.
- Polodny, J. M. & Baron, J. N. (1997). Resources and relationships: Social networks and mobility in the workplace. *American Sociological Review*, 62, 673-693.
- Portes, A. (1998). Social capital: Its origins and application in modern sociology. *Annual Review of Sociology*, 24, 1-24.
- Pravikoff, D. S., Tanner, A. B., & Pierce, S. T. (2005). Readiness of U.S. nurses for evidence-based practice. *American Journal of Nursing*, 105(9), 40-51.
- Priselac, T. M. (2003). Information technology's roles in improving practice environments and patient safety. *Nursing Outlook*, 51(3), S11-S13.
- Provonost, P. J., Weast, B., Holzmueller, C. G., Rosenstein, B. J., Kidwell, R. P., & Haller, K. B., et al. (2003). Evaluation of the culture of safety: Survey of clinicians and managers in an academic medical center. *Quality and Safety in Health Care*, 12(6), 405-410.

- Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.
- Rains, J. W. & Barton-Kriese, P. (2001). Developing political competence: A comparative study across disciplines. *Public Health Nursing, 18*(4), 219-224.
- Rand Corporation (2005). *Health information technology: Can HIT lower costs and improve quality?* Retrieved December 4, 2005, from http://www.rand.org/pubs/research_briefs/RB9136/index1.html
- Retsas, A. (2000). Barriers to using research evidence in nursing practice. *Journal of Advanced Nursing, 31*(3), 599-606.
- Reutter, L. & Williamson, D. L. (2000). Advocating healthy public policy: Implications for baccalaureate nursing education. *Journal of Nursing Education, 39*(1), 21-26.
- Richardson, W. C. & Corrigan, J. M. (2002). The Institute of Medicine quality initiative: A progress report at year six. *The Institute of Medicine. Shaping the future. Newsletter of IOM, 1*(1), 1-8.
- Saba, V. K. (2001). Nursing informatics: Yesterday, today, and tomorrow. *International Nursing Review, 48*, 177-187.
- Saba, V. K. & Taylor, S. L. (2008). Moving past theory: Use of a standardized, coded nursing terminology to enhance nursing visibility. *Computers, Informatics, Nursing, 25*(6), 324-331.
- Sackett, K. M. & Erdley, W. S. (2002). The history of health care informatics.(pp. 453-478. In *Health care informatics: An interdisciplinary approach*. S. P. Englehardt & R. Nelson (Eds.). St. Louis: Mosby.
- Schleyer, T. K. L., & Forrest, J. L. (2000). Methods for the design and administration of web-based surveys [Electronic version]. *Journal of the American Medical Informatics Association, 7*(4), 416-425.
- Schooler, C. & Schoenbach, C. (1994). Social class, occupational status, occupational self-direction, and job income: A cross-national examination. *Sociological Forum, 9*(3), 431-458.
- Schuster, M. A., McGlynn, E. A., & Brook, R. H. (1998). How good is the quality of health care in the United States? [Electronic version]. *The Milbank Quarterly, 76*(4), 517-563.

- Segars, A. H. & Grover, V. (1993). Re-examining perceived ease of use and usefulness: A confirmatory factor analysis [Electronic version]. *MIS Quarterly*, 17(4), 517-525.
- Shabot, M. M. (2006). Ten commandments of implementing clinical information systems. *BUMC Proceedings*, 17, 265-269.
- Shorten, A., Wallace, M., & Crookes, P. A., (2001). Developing information literacy: A key to evidence based practice nursing. *International Nursing Review*, 48(2), 86-92.
- Skiba, D. J. (2006). Preparing for evidence based practice: Revisiting information literacy. *Nursing Education Perspectives*, 26(5), 310-211.
- Simpson, R. L. (2004). The softer side of technology: How IT helps nursing care. *Nursing Administration Quarterly*, 28(4), 302-305.
- Simpson, R. L. (2005). Patient and nurse safety: How information technology makes a difference. *Nursing Administration Quarterly*, 29(1), 97-101.
- Simpson, R. L. (2007). Nursing informatics: The economics of education. *Nursing Management*. Retrieved March 14, 2008, from www.nusingmanagemnt.com.
- Simpson, R. L. (2008). Caring communications; How technology enhances interpersonal relations Part I [Electronic version]. *Nursing Administration Quarterly*, 32(10), 70-73.
- Sorra, J. S. & Nieva, V. F. (2004). *Hospital survey on patient safety culture* AHRQ publication No. 04-0041. Rockville, MD Agency for Healthcare research and quality. Retrieved August 22, 2008, from <http://www.ahrq.gov/qual/hospculture/hospcult.pdf>.
- Souther, E. (2001). Implementation of electronic medical record: The team approach [Electronic version]. *Computers in Nursing*, 19(2). 47-55.
- Spratley, E., Johnson, A., Sochalski, J., Fritz, M., & Spencer, W. (2000). *The registered Nurse Population: Finds from the national sample Survey of registered Nurses*. From Washington, DC. Prepared by the U.S. Department of Health and Human Services, Health Resources, and Service Administration, Bureau of Health Professionals, Division of Nursing. Retrieved January 20, 2008, from <http://bhpr.hrsa.gov/healthworkforce/reports/rnsurvey/rnss1.htm>.
- SPSS Basic 15.0 User's Guide. (2006). Chicago: SPSS Inc.

- Staggers, N. & Thompson, C. B. (2002). The evolution of definitions for nursing informatics: A critical analysis and revised definition [Electronic version]. *Journal of the American Medical Informatics Association*, 9(3), 255-261.
- Stead, W. W., Kelly, B. J., & Kolodner, R. M. (2005). Achievable steps towards building a national health information infrastructure in the United States [Electronic version]. *Journal of the American Medical Informatics Association*, 12, 113-121.
- Stein, M. & Deese, D. (2004). Addressing the next decade of nursing challenges. *Nursing Economics*, 22(5), 273-279.
- Szajna, B. (1994). Software evaluation and choice: Predictive validation of the technology acceptance instrument [Electronic Version]. *MIS Quarterly*, 18(3), 319-324.
- Szreter, S. (2002). The state of social capital: Bringing back in power, politics, and history. *Theory and Society*, 31(5), 573-621.
- Szreter, S. & Woolcock, M. (2004). Health by association? Social capital, social theory, and the political economy of public health. *International Journal of Epidemiology*, 33(4), 650-667.
- Taylor, S. & Todd, P. (1995). Assessing IT usage: The role of prior experience [Electronic version]. *MIS Quarterly*, 19(4), 561-570.
- Technology Informatics Guiding Education Reform. (2006). Retrieved September 30, 2008, from [http://TIGERstandards.pbwiki.com/USE CASES 2006](http://TIGERstandards.pbwiki.com/USE_CASES_2006).
- Thede, L. Q. (2003). *Informatics and nursing: Opportunities and challenges* (2nd ed.). Philadelphia: Lippincott Williams & Wilkins.
- The Commonwealth Fund Commission on a High Performance Health System, Why Not the Best? Results from a National Scorecard on U.S. Health System Performance, The Commonwealth Fund, September 2006. Retrieved October 18, 2007, from, http://www.commonwealthfund.org/publications/publications_show.htm?doc_id=401577&trackTitle=Why%20Not%20the%20Best%3F%20Results%20from%20a%20National%20Scorecard%20on%20U%2ES%2E%20Health%20System%20Performance&trackLable=email%2Dfriend%5FPublications#areaCitation.
- The U. S. health care system: Best in the world or just the most expensive? (2001). Bureau of Labor Education, University of Maine. Retrieved September 30, 2008, from <http://dll.umaine.edu/ble/U.S.%20HCweb.pdf>.

- The World Bank. Dudwick, N., Kuehnast, K., Jones, V. N., & Woolcock, M. (2006). Analyzing social capital in context: A guide to using qualitative methods and data. Retrieved December 16, 2008, from http://siteresources.worldbank.org/WBI/Resources/Analyzing_Social_Capital_in_Context-FINAL.pdf.
- Thomas, L. (1985). Nurses. *Cancer Nursing*, 8, 65.
- Thompson, T. L. & Warren, J. (2008) Information technology and the clinical nurse specialist. *Clinical Nurse Specialist*, 22(6), 261-262.
- Timmons, S. (2003). Nurses resisting information technology. *Nursing Inquiry*, 10(4), 257-269.
- U.S. Census Bureau. (2008). U.S. Census bureau quick facts. Retrieved January 26, 2010, from <http://quickfacts.census.gov/qfd/states/20000.html>
- U.S. Department of Health and Human Services. (2008). HHS secretary announces 12 communities selected to advance use of electronic health records in first ever national demonstration. Retrieved February 19, 2009, from <http://www.hhs.gov/news/press/2008pres/06/20080610a.html>.
- U. S. Department of Health and Human Services (2008b). AHIC use cases and extensions/gaps. Retrieved September 30, 2008, from <http://www.hhs.gov/healthit/usecases>.
- U.S. Department of Health and Human Services. (2007). Nationwide health information network (NHIN): Background and Scope. Retrieved March 17, 2009, from http://healthit.hhs.gov/portal/server.pt?open=512&objID=1142&parentname=CommunityPage&parentid=1&mode=2&in_hi_userid=10741&cached=true.
- U. S. Department of Health and Human Services. (2004a). *The registered nurse population: Findings from the 2004 national sample survey of registered nurses* Retrieved October 1, 2008, from <http://bhpr.hrsa.gov/healthworkforce/rnsurvey04/default.htm>.
- U. S. Department of Health and Human Services. (2004b). *Health information technology: Medication management use case*. Retrieved September 30, 2008, from <http://www.hhs.gov/healthit/usecases/medicationmgmt.html>.
- van der Gaag, M. (2005). *Measurement of individual social capital*. Amsterdam: F & N Boekservices.
- Venkatesh, V. & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior [Electronic version]. *MIS Quarterly*, 24(1), 115-139.

- Venkatesh, V. Morris, M. G., Davis, G. B., & Davis, F. D. (2003). Use acceptance of information technology: Toward a unified view. *Management Information Systems Quarterly*, 27(3), 425-478.
- Wakefield, M. (2008). The quality chasm series: Implications for nursing. In R.G. Hughes (Ed.). *Patient safety and quality: An evidence-based handbook for nurses*. (Prepared with support from the Robert Wood Johnson Foundation). AHRQ Publication No. 08-0043. Rockville, MD: Agency for Healthcare Research and Quality. Retrieved August 22, 2008, from <http://www.ahrq.gov/qual/nursesfdbk/nursesfdbk.pdf>.
- Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2005). *Measurement in nursing and health research* (3rd ed.). New York: Springer Publishing Company.
- Warren, J. (2006). QSEN Competencies and KSA's Draft Post-IHI HPEC Meeting.
- Warren, J. & Connors, H. (2005). Health information technology can and will transform nursing education. *Nursing Outlook*, (55)1, 58 – 60.
- Warren, J. J. & Wilson, R. P. (2006). Representing cardiovascular concepts in an electronic health record using SNOMED CT[®]. *AMIA Annual Symposium Proceedings*, 1135.
- Weaver, C., Warren, J., & Delaney, C. (2005). Bedside, classroom and bench: Collaborative strategies to generate evidence-based knowledge for nursing practice. *International Journal of Medical Informatics*, 74(11-12), 989 – 999.
- Webster, C. (2004). Summary of EHR II from a management workflow perspective. Retrieved December 16, 2005, from <http://www.medrecinst.com/conferences/seminar/july04/proceedings/pdfProceedings/CW.pdf>.
- West, E., Barron, D. N., Dowsett, J., & Newton, J. N. (1999). Hierarchies and cliques in the social networks of health care professionals: Implications for the design of dissemination studies [Electronic version]. *Social Science and Medicine*, 48, 633-646.
- Westra, B. L. (2005). National health information infrastructure (NHII) and nursing: Implementing the Omaha system in community-based practice. Retrieved August 22, 2007, from <http://www.himss.org/content/files/ImplementationNursingTerminologyCommunity.pdf>.

- Wilbright, W. A., Haun, D. E., Roano, T., Krutzfeldt, T., Fontenot, C. E., & Nolan, T. E. (2006). Computer use in an urban university hospital. *Computers, Informatics, Nursing*, 24(1), 37-43.
- Witt/Kieffer. (2003). Chief nursing officers: Their role and keys to effectiveness. Retrieved February 15, 2010, from <http://www.wittkieffer.com/cmfiles/reports/CNOSurveyemar03rev11.pdf>
- World Health Organization. (2000). World health organization assesses the world's health systems. Press release WHO/44. 21/June/00. Retrieved April 25, 2008, from <http://www.who.int/inf-pr-2000/en/pr2000-44.html>.
- Wuest, J. (1994). Professionalism and the evolution of nursing as a discipline: A feminist perspective. *Journal of Professional Nursing*, 10(6), 357-367.
- Wyatt, J. C. (2000). When to use web-based surveys [Electronic version]. *Journal of the American Medical Informatics Association*, 7(4), 426-430.
- Yasnoff, W. A. (Speaker). (2004, September 22). *Research needs for the NHII* (audio & video). University of Illinois, Chicago. Retrieved February 16, 2005, from <http://aspe.hhs.gov/sp/NHII>.
- Yasnoff, W. A., Humphreys, B. L., Overhage, M., Detmer, D. E., Brennan, P. F., Morris, R. W., Middleton, B., Bates, D. W. & Fanning, J. P. (2004). A consensus action agenda for achieving the national health information infrastructure [Electronic version]. *Journal of the American Medical Informatics Association*, 11(4), 332-338.

Appendix A: Letter of Informed Consent

The Electronic Health Record Functionalities in Acute Care Hospitals in the State of Kansas Informed Consent

INTRODUCTION

I understand that I am being invited to participate in a study to determine the Chief Nursing Officer's role in the implementation of an Electronic Health record in Kansas.

PURPOSE

The purpose of this study is to investigate the electronic health record functionalities of acute care hospitals in the State of Kansas with regard to nursing practice. The principle investigator is Mary Menninger-Corder, RN, a doctoral student in nursing at the University of Kansas Medical Center and is interested in learning what role the CNO has in developing and implementation an electronic health record in the hospital in which they work.

PROCEDURE

My participation in this study will involve responding to a questionnaire at a time that is convenient to me. I may fill out the questionnaire at the place of my choosing. The approximate length of time that the questionnaire will require is 15 minutes. My name will not be used as the questionnaires will be identified by a code letter and number and known only to the researcher.

All questionnaires will be stored in a locked file cabinet.

RISKS

I may feel distress as a result of thinking about some of the issues raised in the questionnaire.

BENEFITS

It is impossible to predict if I will receive any personal benefit from participating in this study. I understand that I may benefit from the opportunity to express my experience with the implementation of an electronic health record.

COSTS

There is no cost to me to participate in this study nor is there any payment.

ALTERNATIVES

The alternative to participating in this study is not to participate.

CONFIDENTIALITY

I understand the investigator will keep secret all research related records and information from the study; however any records from this study may be inspected by a sponsor should funding.

QUESTIONS

I have read the information in this form. The investigator has answered my questions to my satisfaction. I know if I any more questions after signing this form, I may contact Mary Menninger-Corder, RN at (785) 233-0246. If I have any questions about my rights as a research study participant, I may call (913) 588-1240 or write Human Research Subjects Committee, University of Kansas Medical Center, 5012 Westcoe, 3901 Rainbow Blvd, Kansas City, Kansas 66160-7700.

CONSENT

The investigator gave me information about how I will participate in this study and how long it will take. She told me it is voluntary and that there are no known risks or benefits. I agree to take part in this study as a research participant. I am aware that I may quit at any time or refuse to answer any questions that are uncomfortable for me. In the event that I decide to quit, the information I have already provided will be kept in a confidential manner.

Type/Print Participant's Name

Date

Participant's Signature

Witness (to participant's signature of document)

Date

Witness Signature

Responsible Investigator

Date

Investigator's Signature and Telephone Number

Appendix B: Nursing Informatics in the State of Kansas Survey

Nursing Informatics in the State of Kansas Survey

University of Kansas Medical Center, School of Nursing Student Investigator: Mary Menninger-Corder, RN, PhD (c) Dissertation Committee: Dr. Judith J. Warren, Dr. Juliana Brixey, Dr. Lynne Connelly, Dr. Helen Connors, Dr. Mike Grasso

Title: EHR Support for Nursing Practice in the State of Kansas Survey

Thank you for taking the time to participate in this survey. This survey should take 15-20 minutes to complete. All responses will remain confidential.

This study aims to describe current conditions of EHR implementation in the State of Kansas. It is also interested in how, as the CNO, the perception of your social capital might affect the implementation of your EHR. Social capital is understood to be the quality of your relationships with and between others whose resources you might access and who may assist you in achieving goals that you might not be able to achieve on our own.

Your replies will remain confidential and you may choose not to answer any question, and simply leave it blank. To ensure confidentiality your name and email address will be 'coded' and this code will be used only to determine who should receive reminder emails. Once you complete the survey, your name is removed from the email distribution list and is no longer connected with any survey data.

If you choose not to participate in the survey, you may close out the program at any time prior to hitting "**submit button**" and your answers will not be recorded. Completing this survey indicates your consent for use of the answers you supply. The Human Subjects Institutional Review Board at the University of Kansas Medical Center has approved this consent document for use.

If you are interested in receiving a copy of the summarized results, there will be an opportunity at the end of the survey to submit your name and email address indicating your interest. All results will remain confidential—your name and institution will not be linked in any way with the survey results. Your name, if submitted, will be extracted from the survey data and maintained in a separate file to ensure that no responses can be linked to your department or institution. If you do not feel comfortable supplying your name and email in this manner, but would still like a copy of the results, you can leave these fields blank and email the researcher directly at mmenninger-corder@kumc.edu for a copy of the results. If you have any questions or concerns, you can contact the researcher, Mary Menninger-Corder, 785.233.0246, or at mmenninger-corder@kumc.edu. You may also contact the dissertation Chair, Dr. Judith J. Warren, 913.588.4286, University of Kansas Medical Center or at jwarren2@kumc.edu if any questions or problems arise during the course of this study.

Nursing Informatics in the State of Kansas Survey

Please take a few minutes to fill out this survey. All your feedback will be kept confidential.

Thank you for your participation.

Demographic Information

1. What is your current age?

Your age:

2. What is your gender?

Male Female

3. What is your highest level of education?

- Associate Degree/Technical Degree
- BA/BS Degree
- Some Graduate level courses
- MA/MS Degree
- Post-graduate level courses
- PhD/EdD

4. Number of years in your current position:

Number of Years:

5. What is your current position?

6. What is the number of licensed beds in your hospital?

Number of beds:

7. How many Clinics in your Medical Center?

Number of Clinics:

8. Do you belong to any Professional Organizations?

Yes No

9. Do you belong to any civic organizations?

Yes: (please describe)

No

10. Do you belong to any clubs?

Yes: (please describe)

No

11. Please check one of the following items regarding EHR:

We have implemented an EHR

We are selecting an EHR

We are in the process of implementing an EHR

We have no plans to use an EHR (if this is selected, you will immediately go to question #20)

If you have NO plans for an EHR, please go to Question # 20 and complete the survey.

Thank you

12. How does the EHR support Nursing Practice?

	Not at all	To a limited extent	To a moderate extent	To a large extent	Do Not Know
Does your EHR system save nursing staff time?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does your EHR system provide greater accuracy of patient data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does your EHR system make patient care safer?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you think there is less patient care error with the EHR system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is your EHR system more patient-centered than a paper based record (patient focused)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does your nursing staff feel disconnected from patient care because of the use of the EHR system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When your nursing staff uses the EHR system, do they feel more informed about the patients?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you think the EHR system is a waste of your nursing's	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Not at all	To a limited extent	To a moderate extent	To a large extent	Do Not Know
staff time?					

12. How does the EHR support Nursing Practice? (cont)

	Not at all	To a limited extent	To a moderate extent	To a large extent	Do Not Know
Do you feel using your EHR system favors efficiency over accuracy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you feel care is less personalized with the use of the EHR system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you think the nursing staff spend less time with their patients because of the use of the EHR system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you think the nursing staff feels disconnected from their work if the computer "goes down"?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you feel disconnected from your work if the computer "goes down"??	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do nurses at your facility prefer paper charting over computer charting in the EHR?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does your nursing staff transcribe their nursing notes from scraps of paper to the computer?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. How does the EHR support Nursing Practice? (cont)

	Not at all	To a limited extent	To a moderate extent	To a large extent	Do not Know
Does your nursing staff use the computer to look up (research) information regarding patient diagnoses?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does your nursing staff use the computer for information regarding evidence-based practice?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Not at all	To a limited extent	To a moderate extent	To a large extent	Do not Know
Does the EHR system improve access to information?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the computer improve information retrieval?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you think other disciplines read nursing documentation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the use of the EHR system limit your nursing's staffs critical thinking skills?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can your nursing staff measure patient's self care strategies in your EHR system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can your nursing staff measure patient satisfaction by using the EHR system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. Is there anything else you care to add about how the EHR supports Nursing Practice?

14. Nurses' role in implementing the EHR:

	Not at all	To a limited extent	To a moderate extent	To a large extent	Do Not know
I was the person who advocated for the EHR system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Board of Directors determined to invest in the EHR system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was approached in documentation requirements and regulation, though I am not an expert in EHR use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I formed a committee to select the EHR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I served on one of the EHR implementation committees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was on an EHR design committee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I chose to be on an implementation committee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Not at all	To a limited extent	To a moderate extent	To a large extent	Do Not know
I worked with the EHR vendor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am an EHR expert myself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I participated in training the nursing staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was only peripherally involved with the EHR before it was implemented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. Did you have previous experience with information technology (IT)?

Yes: (please specify)

No

16. Regarding the implementation of the EHR by the nursing staff:

	Not at all	To a limited extent	To a moderate extent	To a large extent	Do Not Know
Do you personally feel comfortable with information technology?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you personally think your EHR system is easy to use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you think your EHR system is useful in your nursing staff's work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do your nursing staff get support from the information technology staff?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do your nursing staff get support from the nursing managers or nurse directors?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Deleted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you get support from the nursing staff on implementation of the EHR?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did your nursing staff get enough training from the vendor or implementation team?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do your nurses feel free to ask questions regarding the EHR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Not at all	To a limited extent	To a moderate extent	To a large extent	Do Not Know
system?					

16. Regarding the implementation of the EHR by the nursing staff: (cont)

	Not at all	To a limited extent	To a moderate extent	To a large extent	Do Not know
Were your nursing staff engaged in the EHR project implementation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did your nursing staff feel like they were part of the EHR implementation team?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were your nursing staff encouraged to learn from others?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you feel as if you have a trusting relationship with the nursing staff?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you feel as if you have a trusting relationship with nursing managers or directors?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you feel as if you have a trusting relationship with other members of the hospital administration?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you feel as if you have a trusting relationship with the IT staff?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In general do you feel most people can be trusted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you feel like you were responsible for teaching yourself about EHRs and their use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In general do you feel that most people are trying to be helpful?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you feel powerful in your profession?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. Do you have anything else you would care to add?

Patient Documentation in your EHR:

Very few health care institutions have implemented a comprehensive EHR system. Therefore, it is important to know what functionality you have implemented in your system so that we may understand the scope of your EHR implementation.

18. What patient documentation is in your EHR? Please check all that apply.

- Medication Administration Record (MAR)
- Nursing Progress Notes
- Patient assessments
- Allergy Alerts
- Nursing Care Plans
- History and Physical
- Scheduling Treatments
- Tracking Treatments
- Diagnostic Test Results
- Documenting Patient Education
- Recording Vital Signs
- Documentation of Falls
- Documentation of Wounds
- Documentation of Pressure Sores
- Documentation of Incident Reports
- Patient Charges
- There is NO Nursing Documentation
- Used Only for Physicians
- Admissions
- Discharges
- Transfers
- Discharge Summaries
- Consults
- Interdisciplinary Notes
- Computerized Provider Order Entry
- Other:

19. Related to your EHR system, is there anything else you would care to add?

Social Capital and Network:

Social Capital is defined as the degree to which a community or individuals collaborate and cooperate through such mechanisms as networks, shared trust, norms, and values to achieve mutual benefits, enabling the accomplishments of social and economic goals. It is the embedded resources an individual can access in a social network. Cohen & Prusak, 2001; Coleman, 1988; Lin, 2005).

The following questions will help measure the degree of your social capital as derived from the work of Lin's (2005) social capital theory.

20. Among your relatives, friends, or acquaintances, are there people who have the following jobs? Please check all that apply. Specify approximately how many of these people you know in the adjacent box.

- Business Executive:
- Business Owner:
- CEO of a company:
- Domestic Worker:
- Farmer:
- Federal/State Employee:
- General Office Worker:
- Journalist:
- Laborer:
- Lawyer:
- Mechanic:
- Manager of a small company:
- Nurse:
- Physician:
- Policeman:
- Professor:
- Rancher:

- Reporter:
- Senator/Representative
- Student:
- Teacher:

21. Among your relatives, friends, or acquaintances, are there people who have the following jobs? Please check all that apply.

Specify "relative", "friend", or "acquaintance" in each box as it applies to you.

- Business Executives:
- Business Owner:
- CEO of a company:
- Domestic Worker:
- Farmer:
- Federal/State Employee:
- General Office Worker:
- Journalist:
- Laborer:
- Lawyer:
- Manager of a small company:
- Mechanic:
- Nurse:
- Physician:
- Policeman:
- Professor:
- Rancher:
- Reporter:
- Senator/Representative:
- Student:
- Teacher:

22. Among these contacts are there any relationships that you consider key or special? If so, which one(s)?

23. If you do NOT know anyone with these jobs, who would you go to to find such a person?

24. Who would that person be to you? (i.e., mentor, advisor, colleagues)

25. What job do they do?

Thank you very much for participating in this survey!