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UNF UNIVERSITY of NORTH FLORIDA

FRAMEWORKS FOR PATIENT SAFETY IN THE NURSING CURRICULUM

by

Theresa Maria Chenot

A dissertation presented to the Department of Leadership, Counseling, and Instructional Technology in partial fulfillment of the requirements for the degree of

Doctor of Education

UNIVERSITY OF NORTH FLORIDA

COLLEGE of EDUCATION AND HUMAN SERVICES

September, 2007

The dissertation of Teri Chenot is approved:

Signature Deleted

Larry G. Daniel, Ph.D., Chair — 09/24/2007 Date

Signature Deleted

Joyce T. Jones, Ed.D — September 24, 2007 Date

Signature Deleted

John Kemppainen, Ph.D. — Sept. 24, 2007 Date

Signature Deleted

Pamela S. Chally, Ph.D. — Sept 24, 2007 Date

Signature Deleted

Robert Wears, M.D. – University of Florida, College of Medicine — 24 Sep 07 Date

Accepting for the Department:

Signature Deleted

Jennifer Kane, Ph.D., Interim Chair — 1/24/08
Department of Leadership, Counseling, and Instructional Technology

Accepting for the College:

Signature Deleted

Larry G. Daniel, Ph.D., Dean — 01/24/2008
College of Education & Human Services

Accepting for the University:

Signature Deleted

David E.W. Fenner, Ph.D. — 24 JAN 2008
Dean, The Graduate School

Acknowledgements

The journey one takes to complete a dissertation is similar to running a marathon. Ultimately, it is sheer mental endurance that gets one to the finish line. In my case, there were many colleagues, family, and friends to support me on the way.

First and foremost, I offer thanks to my dissertation committee. It was important to me to have an accomplished group of scholars who knew me, worked with me, and held me accountable for the highest level of excellence. To my committee chair, Dr. Larry Daniel, I offer my deepest thanks for his enthusiasm and support of both my studies and of me as an individual. To Dr. Joyce Jones, my heartfelt thanks for her encouragement to pursue this doctorate. Thanks to Dr. John Kemppainen for his continued support and guidance. My sincere appreciation to Dr. Pam Chally for her mentorship and expertise as a nurse leader, which guided me in my own personal growth in the profession. Finally, to Dr. Robert Wears, I am most appreciative of his continued support and guidance in my transformational growth in the field of patient safety so that I may make a contribution to help improve health outcomes.

There have been many educators along my path who have made a positive contribution. My journey began in the Oak Hills School District in Cincinnati, OH. My deepest thanks go to my middle school math teacher, Mr. Edward C. Eckel at Delhi Junior High School, who instilled an inspirational philosophy to my class from which my drive for achievement began. My sincere appreciation goes to Mrs. Carole Pohl and Dr. Rose Sherman who were my advisors and professors at Florida Atlantic University. I would like to thank Dr. Li Loriz for her assistance with my study.

I would like to thank the members of Cohort 13 for their support, humor, and friendship over the past 4 years. I could not have wished for a better group of people with whom to have experienced that time.

I wish to thank my family. To my sons, Christopher and Sean, may you always know the love and importance that you have in our family. I am so very proud of each of you and encourage you to strive for the highest level of education possible, go after your dreams in life, and make the world a better place. One day I hope that you will understand that your very existence enabled me to go after and accomplish my dreams!

To my husband Ron Chenot, a very special thanks for his love, support, and tolerance of my drive for this achievement. No words can adequately express your contribution to this dream. I would not have been able to accomplish this without you.

I wish to thank my parents, Richard and Betty Regan, for raising such an independent, driven daughter at a time when that was not the norm. I am happy that you were able to experience the journey with me as I cross the finish line.

In closing, I wish to thank all of my nursing colleagues. May this dissertation be my positive contribution to the nursing profession so that I can make the world a better place.

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Abstract

Patient safety (i.e., the degree to which patients are free from accidental injury) has received a great deal of media coverage during the past few years. Professional and regulatory agencies have indicated that patient safety education should be provided to healthcare workers to improve health outcomes. The primary purpose of this exploratory study was to gain a better understanding of the current status of patient safety awareness among pre-licensure nursing students. To this end, six research questions guided the study:

1. Will interpretable item constructs be identified when responses to the Healthcare Professional Patient Safety Assessment Curriculum Survey (HPPSACS) are intercorrelated and factor analyzed using R-technique exploratory factor analysis?
2. Will responses to items on the HPPSACS yield scores that are internally consistent as indicated by alpha reliability coefficients?
3. What are the perceptions of nursing students about their awareness, skills, and attitudes regarding patient safety?
4. (a) To what extent is there a relationship between the demographic variables of age and gender and nursing students' perceptions of their patient safety awareness, skills, and attitudes?

   (b) To what extent is there a relationship between the demographic variable of race/ethnicity and nursing students' perceptions of their patient safety awareness, skills, and attitudes?

5. To what extent is there a relationship between the type of collegiate nursing program and nursing students' perceptions of their patient safety awareness, skills, and attitudes?
6. To what extent are there discernable program curriculum and instructional methodologies that have been traditionally associated with more positive nursing student perceptions of awareness, skills, and attitudes regarding patient safety?

Phase I was a pilot test for reliability and construct validity for the HPPSACS. Data were factor analyzed to determine factor constructs for the purpose of identifying the key themes accounting for the variation in response across 23 survey items. Three factors with themes that were found to relate to perceptions of patient safety among a scholarly professional group of nurses were identified as comfort, error reporting, and denial. Findings in Phase II of the study indicated that there were four identifiable constructs with the study data: the themes of comfort, error reporting, denial, and culture. Older male participants had higher comfort subscale scores and lower culture subscales scores than did younger female participants. The Asian American participants were clearly distinguished from the combined set of African American and Hispanic participants on the denial and culture scores. The "other" ethnic identity was clearly distinguished from the combined set of Caucasian and Hispanic participants on the comfort and error reporting scores. The associate nursing degree programs were clearly distinguished from the combined set of the accelerated and traditional nursing degree programs. Findings in Phase III of the study indicated that all seven of the participating nursing schools included at least three of the Institute of Medicine's six core competencies, with one school exhibiting all of the core competencies.

Chapter 1

INTRODUCTION

Patient safety has received a great deal of media coverage during the past few years. This increased media coverage is partly due to two reports published by the Institute of Medicine (IOM, 2001; Kohn, Corrigan, & Donaldson, 1999). These reports discussed the number and types of medical errors that have occurred in medical institutions across the United States. The IOM report (Kohn et al.) included a study that found that the number of Americans who die each year due to medical errors may be as high as 98,000, making deaths due to medical errors the eighth leading cause of death. In fact, more people die in a given year as a result of medical errors than from motor vehicle accidents, breast cancer, or AIDS (Barach & Berwick, 2003; Jacott & Jacott, 2003; Lovern, 2002; Pape, 2001; Woods, 2003).

In addition, medication errors cause another 7,000 deaths. The cost to the health system is astronomical. The IOM (1999) estimated that medical errors cost the U.S. approximately $38 billion per year with about $17 billion of those costs associated with preventable errors (Kohn et al., 1999). Based on data collected over several years from multiple partner institutions, the Institute for Healthcare Improvement (2007) estimates that nearly 15 million incidents of medical harm occur in the U.S. each year—a rate of over 40,000 per day. Just from this information, it is evident that medical errors are a national public health problem that has resulted in substantial morbidity and mortality. The U.S. healthcare system must address this epidemic in the same manner that it targets

diseases such as cancer, diabetes, and heart disease. The federal government is aggressively taking action to reduce medical errors and improve patient safety. In fact, recent congressional action appropriated $50 million to provide for these initiatives (Elkin & Gorman, 2002). It is also incumbent upon healthcare educators to examine the preparation of professionals to assure appropriate pre-service awareness, skills, and attitudes are attained. The present study examined the pre-service preparation of registered nurses in patient safety awareness, skills, and attitudes.

Background

As healthcare organizations seek to enhance safety and quality in a changing environment, organizational learning can help to improve existing awareness and skills and provide opportunities to discover better ways of working together. Healthcare has never been simple, but the complexity of healthcare has increased along with demands for greater value and expectations for predictable safety. The economic and ethical burden of preventable injury resulting from medical management failures is immense. Preventable injuries to patients are beginning to be understood in terms similar to adverse events in other complex, risky industries that have learned to rely on the language of systems and causal analysis to create a foundation for continuous quality improvement and high reliability.

Healthcare leadership is the focal point in the rapidly growing movement to improve patient safety and the critical role of educational leadership in this movement is rapidly becoming recognized. Trustees and governing boards of healthcare organizations have an important role in ensuring the safety of the organizations by holding the

leadership accountable for defining and meeting the goals of a safety plan. In so doing, patient outcomes will improve which will result in an overall safer health system for the organization (Mohr, Abelson, & Barach, 2002). Concomitantly, educational leaders in healthcare should strive to develop curriculum frameworks that place appropriate emphasis on patient safety. It is important that healthcare educators communicate a safety vision to their students and a sense of personal responsibility for assuring that systematic planning for addressing errors is a priority in their future professional practice.

Statement of the Problem

With all of the attention being paid in the healthcare industry and at all levels of government, the delivery of healthcare to patients is still far from perfect. The need to address what are already highly visible quality and patient safety problems is becoming increasingly urgent. Many factors contribute to these problems, including minimally applied safety engineering principles, such as systems thinking across healthcare settings, and cost-driven payer incentives that equally reward low-quality as well as high-quality care. But just as health professionals can be instrumental in the creation of medical successes, they also can hinder them. There are serious concerns about current healthcare education approaches to quality and patient safety, and the environments in which education and training are conducted. These concerns extend to the ongoing education—life-long learning—of practitioners and emerging healthcare leaders as well.

There has been a great deal of effort within individual healthcare disciplines to improve the quality and effectiveness of academic and training environments. However, a major upgrade of the education and training of health professionals to address health outcomes requires efforts among key health stakeholders focused on core competencies

across various education and training programs and work environments. In the report titled *Health Professions Education: A Bridge to Quality* (Greiner & Knebel, 2003, p. 1), the IOM found that nurses and other health professionals are not adequately prepared to provide the highest quality and safest care possible. In particular, nurses play a critical role in protecting patient safety and providing quality healthcare. There is an emerging body of research showing that nurses are much more likely than any other health professional to recognize, interrupt, and correct errors that are often life threatening (Rothschild, Hurley, Landrigan, & Cronin, 2006). There is little evidence-based research on a recommended set of competencies for nursing students to ensure safer practitioners to improve health outcomes. There is currently little empirical data to address what type of patient safety curriculum is needed to produce safer practitioners, although literature reports that such information is clearly needed. Professional healthcare organizations are just now in the process of addressing this concern. To date, there have been more studies regarding patient safety education for physicians.

Purpose and Research Questions

The primary purpose of this exploratory study was to gain a better understanding of the current status of patient safety awareness among registered nurses and pre-licensure nursing students. To this end, six research questions guided the study:

1. Will interpretable item constructs be identified when responses to the Healthcare Professionals Patient Safety Assessment Curriculum Survey (HPPSACS) are intercorrelated and factor analyzed using R-technique exploratory factor analysis?
2. Will responses to items on the HPPSACS yield scores that are internally consistent as indicated by alpha reliability coefficients?

3. What are the perceptions of nursing students about their awareness, skills, and attitudes regarding patient safety?
4. (a) To what extent is there a relationship between the demographic variables of age and gender and nursing students' perceptions of their patient safety awareness, skills, and attitudes?

   (b) To what extent is there a relationship between the demographic variable of race/ethnicity and nursing students' perceptions of their patient safety awareness, skills, and attitudes?
5. To what extent is there a relationship between the type of collegiate nursing program and nursing students' perceptions of their patient safety awareness, skills, and attitudes?
6. To what extent are there discernable program curriculum and instructional methodologies that have been traditionally associated with more positive nursing student perceptions of awareness, skills, and attitudes regarding patient safety?

Significance of the Research

The present descriptive research study is significant in that it examined current patient safety education for nursing students and provides recommendations for improving patient safety education in the academic nursing curriculum to enhance health outcomes for patients. Nurses comprise the largest number of healthcare providers and, due to their job scope, are usually at the point-of-care with the patient and the first provider to assess a change in the patient's health status. Raising the requirements and standards for patient safety education in the academic nursing curriculum can assist in improving health outcomes by preparing nursing students to be safer practitioners.

Another result of the present study is recommendations for policy development affecting the curriculum of state approved academic nursing programs of study including possible mandates for patient safety education. The study also lays the groundwork for future research to examine patient safety education instructional methods. For example, innovations such as human patient simulator training might be investigated to determine their impact on successful student learning outcomes.

Methodology

This study consisted of three phases. Phase I was the pilot test for reliability and construct validity analysis for scores on the HPPSACS using exploratory factor analysis and data obtained from 150 scholarly professional nurses. Phases II and III were the substantive components of the study. Seven universities and colleges consented to their school of nursing's participation in this research study. The dean of the College of Health and the director of the School of Nursing at one of the participating institutions served as reviewers for instrument face validity. Participation included obtaining a liaison at each of the seven schools to facilitate administration of the HPPSACS to nursing students in their final semester of study. In addition, each school provided the researcher a copy of their current patient safety curriculum for content analysis and comparison. A total of 318 nursing students completed the HPPSACS. The completed surveys were obtained from each liaison at the seven universities and colleges. In addition to exploratory factor analysis, canonical correlation analysis, descriptive statistics, and discriminant analysis were used to analyze the data for results.

Definition of Terms

For the purpose of the present study, the following operational definitions were employed:

Patient Safety	The degree to which patients are free from accidental injury.
RN-to-BSN Program	A program in which the students have already completed their associate degree in nursing and are registered nurses pursuing their bachelor's degree in nursing.
Accelerated Program	A program in which the students have already obtained a bachelor's degree in a field other than nursing and are pursuing a bachelor's degree in nursing.
Traditional Nursing Program	A program in which the students are pursuing a bachelor's degree in nursing without prior credentialing as a registered nurse.

Organization of the Study

The study is organized into five chapters. Chapter 1 presents an overview of the study. Specifically, it offers a statement of the problem, purpose statement and research questions, comments regarding the significance of the research, and finally definitions of terms.

Chapter 2 offers a review of the literature. The review encompasses the theoretical framework of the study including current nursing research and adult learning concepts applicable to patient safety, which is critical information for nurse leaders committed to the prevention of medical errors to improve health outcomes.

Chapter 3 presents the methodology used in the study. Details are offered regarding the research design, sample, instrument, procedures, data analysis, and confidentiality and institutional review board approval. A discussion of the delimitations and limitations concludes the section.

Chapter 4 presents the findings of the study, including overviews of all three phases of the study, and discussion of how the data were used to address the six research questions. The chapter concludes with a summary of the three phases that framed the study.

Finally, chapter 5 provides a review of the methodology, summary of the findings and a discussion of the results of the study. The theoretical framework upon which the study was formulated will be linked to the study's findings. Conclusions are drawn, recommendations are made for nurse leaders and educators, and recommendations are provided for future research related to this study.

Chapter 2

REVIEW OF THE LITERATURE

It is important to understand the historical progression of the patient safety movement and the implications for complex healthcare systems. This review of the literature provides the theoretical framework upon which the study was based. It examines the emergence of patient safety in healthcare systems. The areas of adverse events management and high-reliability organization (HRO) theory are discussed. The relevance of patient safety for leaders at the macro-system level and the implications for nursing at the micro-system level will be addressed.

Research has indicated that registered nurses and chief nursing officers believe that the shortage of nurses has affected the quality and safety of patient care negatively (Buerhaus, Donelan, Ulrich, Norman, & Dittus, 2006). Yet hospitals and other healthcare delivery organizations are experiencing increasing pressure to provide higher-quality and safer patient care regardless of whether there are shortages of nurses. There is an emerging body of research showing that nurses are much more likely than any other health professional to recognize, interrupt, and correct errors that are often life threatening (Rothschild et al., 2006). They play a critical role in health outcomes. The argument can be supported by the IOM's report, *Health Professions Education: A Bridge to Quality*, that patient safety should be included as content in the nursing curriculum (Greiner & Knebel, 2003) and this argument serves as the theoretical framework for the present study. The literature review concludes with patient safety and the nursing

curriculum, research, and adult learning methodologies as the appropriate set of practices to enhance the nursing students' awareness, skills, and attitudes towards patient safety to graduate safer practitioners and thereby improve health outcomes.

Theoretical Framework

The issues of patient safety and medical error have been well documented in a series of national studies by the IOM of the National Academies (Greiner & Knebel, 2003; IOM, 2001; Page, 2004). The high rate of medical errors is a complex issue, with many underlying causes. It is clearly a symptom of a broken health system. The IOM (Greiner & Knebel) concluded that education for healthcare professionals is in need of a major overhaul, stating, "clinical education simply has not kept pace with or been responsive enough to shifting patient demographics and desires, changing health system expectations, evolving practice requirements and staffing arrangements, new information, a focus on improving quality, or new technologies" (p. 1).

Addressing these changes requires significant alterations in how healthcare systems are engineered. Central to this ability to reengineer is the preparation of highly skilled healthcare professionals with a new and different set of knowledge, skills, and abilities. *Health Professions Education: A Bridge to Quality* (Greiner & Knebel, 2003) recommended an overarching vision for all programs and institutions engaged in the education of healthcare professions and that "all health professions 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). Embedded in the report are two significant reforms: (a) a shift to a competency-based

approach to education for all healthcare professionals; and (b) the core competencies identified as essential for healthcare professionals to respond to patients' care.

The outcome-based education movement is not new. Broad outcomes have been incorporated into nursing accreditation processes for several years. However, the ideas underlying competency-based education, such as making learning outcomes explicit, developing clinical education to support students' attainment of competencies, then ensuring students are competent through standard assessments in the specified areas, have gained new appeal. The approach appears to be responsive to growing concerns about patient safety, the tremendous variation in nursing practice among geographic settings, and the desire for increased accountability both in higher education and in healthcare (Tanner, 2003).

It is important to note that changes will be required in how the nurses of tomorrow are educated. As the largest single group of healthcare providers, nurses must be prepared for the practice changes called for by the IOM (Greiner & Knebel, 2003). According to E. L. Smith (2006), given that nurses assess, plan, implement, and evaluate patient care, their education on and involvement in patient safety and quality care initiatives are vital. It is evident that significant pre-licensure curricular innovation will need to occur now so that the next generation of nurses will emerge from their programs prepared with the requisite knowledge, skills, and attitudes. Nursing education has traditionally focused on the development of individual practitioners able to deliver quality care, while little emphasis has been placed on competency development related to improving systems that affect the individual's ability to provide that care. Curricular changes and the accompanying change in pedagogical strategies are necessary. Barriers

to implementation, including an already maximized curriculum, a growing faculty shortage, the need for faculty development in the competency content areas, and the generally slow pace of curricular change, must be addressed.

As a response to the IOM (Greiner & Knebel, 2003) quality and safety challenge, Cronenwett et al. (2007) with funding by the Robert Wood Johnson Foundation, proposed a conceptual framework (Quality and Safety Education for Nurses [QSEN]) outlining six core competencies for pre-licensure nursing students, of which the content domains include patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics with related knowledge, skills, and attitudes to be met by nursing students for competency as a respected nurse. The proposed competency definitions were developed with the goal of being expansive enough to be used as frameworks for educational programs, licensure, and certification for all registered nurses (E. L. Smith, Cronenwett, & Sherwood, 2007). Innovative pedagogical strategies to successfully meet these competencies could include narrative pedagogy, simulation experiences (Bremner, Aduddell, Bennett, & VanGeest, 2006; Haskvitz & Koop, 2004; Henneman & Cunningham, 2005; Paparella, Mariani, Layton, & Carpenter, 2004; Scropian, Brown, Gavilanes, & Driggers, 2004); interprofessional learning opportunities (Barnsteiner, Disch, Hall, Mayer, & Moore, 2007), and new approaches to clinical learning (Bakken et al., 2004; Burns & Foley, 2005; Cronenwett et al., 2007; Day & Smith, 2007; Diefenbeck, Plowfield, & Herrman, 2006; Greenfield, 2007; Jacobson, Grindel, & Lewis, 2006; Papastrat & Wallace, 2003; Sherwood & Drenkard, 2007; E. L. Smith, 2006; Taylor, 2001; Thomas, Sherwood, & Helmreich,

2003; Thompson, 2003; Wolf & Serembus, 2006) that will help to impart these content domains to students.

In summary, the high rate of medical errors is a complex issue with many underlying causes. It is clearly a symptom of a broken system. The IOM (Greiner & Knebel, 2003) concluded that education for healthcare professionals is in need of a major overhaul. Central to this premise is the preparation of highly skilled healthcare professionals with a new and different set of knowledge, skills, and abilities. It is important to note that changes will be required in how the nurses of tomorrow are educated. As a response to the IOM (Greiner & Knebel) quality and safety challenge, Cronenwett et al. (2007) proposed a conceptual framework that pre-licensure nursing students could have six core competencies of which the content domains include patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics with related knowledge, skills, and attitudes to be met by nursing students for competency as a respected nurse.

Emergence of Patient Safety

The patient safety movement emerged in what will be historically recognized as a period of great change in healthcare. Strong forces working broadly in society have converged to shape this movement. These forces include a rise in self-determination, a hypercompetitive economic mindset that has threatened ethical values, other sources of intense cost pressure, an information revolution, and rapid change. Patient safety and quality improvement have been identified as critical clinical and research endeavors by the federal government, accrediting bodies, regulatory agencies, and patient advocacy groups (Barach & Berwick, 2003).

Growth in the field of the quality movement in the 1970s and 1980s helped lay the groundwork for new ideas about safety, HROs, and successful economic models built on these theories (Barach & Berwick, 2003). The quality movement borrowed liberally from industry norms as a new class of cross-trained healthcare professionals arose. The safety movement demands much greater integration of disciplines. These include, but are not limited to, the clinical sciences; organizational, cognitive, and social psychology; bioengineering; human factors studies; systems and information management sciences; ethics; and the law (Barach & Berwick).

Most experts who have examined the status of patient safety say the answer to the patient safety issue lies, first, in welcoming the opportunity to learn from errors and, second, in redesigning systems and organizations systematically to limit the potential for errors. The public recognizes that medical errors are, in fact, common. Eisenberg (2000) cited that the National Patient Safety Foundation conducted a survey that found that 42% of Americans had experienced a serious medical error involving either themselves or a close relative. That is almost half of all Americans who have personally encountered serious medical errors. Research shows that the answer to reducing errors does not lie in "name, blame, and shame." One must look at a systems approach for a solution. Eisenberg cited the landmark work that was done by Lucian Leape at Harvard, which showed that 78% of errors are systems problems. Based on an investment in a strong research foundation in healthcare quality measurement and improvement, Eisenberg offered eight key lessons for education if it is to parlay the interest in patient safety into enhanced continuing education and quality improvement in learning healthcare systems: (a) informatics for information; (b) guidelines as learning tools; (c)

learning from opinion leaders; (d) learning from the patient; (e) decision support system; (f) the team learning together; (g) learning organizations; and (h) "just-in-time" and "point-of-care" delivery (p. 197). These eight lessons suggest megatrends in health care.

> In effect, they promote using information systems for dispensing information. They mean having guidelines that are evidence based and readily available. They mean using opinion leaders to affect change. They mean empowering patients as coproducers of care. They mean using computer-based decision support systems. They mean thinking in terms of teams of decision makers, not individuals. They mean thinking about organizations as systems. They mean thinking about "just-in-time" and "point-of-care" information delivery. In summary, they mean learning to improve the quality of care, including the prevention of adverse events from medical errors. (Eisenberg, p. 206)

Billings and Woods (2001) cited that the patient safety movement began around 1995 as the public and press, concerned over the consequences of economic and organizational change, reacted dramatically to a series of celebrated medical failures. The Dana-Farber Cancer Institute made a tragic discovery. Medical errors had caused the death of one patient and triggered significant medical intervention in another. Since that tragedy, the Dana-Farber Cancer Institute's journey has been one of dramatic learning and continuous improvement. The events that led to the patient's death occurred over several days and involved many practitioners, signaling a breakdown in all of the systems that should protect patients (Billings & Woods; Greene, 2003). An essential element has been recognizing the power and responsibility of leadership to create a culture of patient safety. Leadership—the board of trustees and medical, nursing, and administrative

executives—must be accountable for quality improvement and patient safety. Most executives are painfully concerned about safety, but other pressures keep them from engaging in the issues. Conway (2000b) suggested several approaches healthcare leaders could use to keep focused on patient safety: (a) become students in patient safety; (b) establish a non-punitive environment that fosters internal reporting of errors and near misses; and (c) engage in safety discussions and educational programs with patients, family members, and consumers. Healthcare leaders can send a strong message emphasizing their understanding of the realities of practice and applying their personal leadership to improve patient safety.

Leape and Berwick (2005) examined the organizational shifts that have occurred in healthcare systems in quality and safety since the IOM's release of the report *To Err is Human* (Kohn et al., 1999). They noted that barriers to progress include increasingly complex healthcare systems, a history of autonomy of care, and current financial incentive systems. Their expected vision for the next 5 years includes: (a) the adoption of electronic medical records; (b) team training; and (c) full disclosure to patients with a call for increased funding and policy as well as ambitious but achievable safety targets.

In summary, the patient safety movement emerged during a period of great change in healthcare. Growth in the field of the quality movement in the 1970s and 1980s helped lay the groundwork for new ideas about safety including greater integration of disciplines. Most experts say the answer to patient safety lies in learning from errors and in redesigning systems and organizations systematically to limit the potential for errors. An essential element in addressing organizational medical errors has been recognizing the power and responsibility of leadership to create a culture of patient safety.

Adverse Events

Adverse events are important markers of the quality of care in hospitals. Because iatrogenic injury is so common, efforts to identify and prevent adverse events should be given a high priority in the quality improvement agenda. An adverse event is defined as an unintended injury that is caused by medical management and that results in prolongation of hospitalization or disability at the time of discharge (Petersen, Lee, O'Neil, Cook, & Brennan, 1992).

Reason (1990) described an error as a generic term to encompass all those occasions in which a planned sequence of mental or physical activities fails to achieve its intended outcome, and when these failures cannot be attributed to the intervention of some chance agency. Slips and lapses are errors which result from some failure in the execution and/or storage stage of an action sequence, regardless of whether or not the plan which guided them was adequate to achieve its objective. Mistakes may be defined as deficiencies or failures in the judgmental and/or inferential processes involved in the selection of an objective or in the specification of the means to achieve it, irrespective of whether or not the actions directed by this decision-scheme run according to plan (Reason, 1990).

Based on sentinel events that have been reported to the Joint Commission at this time, some of the most common problems are related to medication delivery. Reviewing the medication delivery process to reduce the risk of errors is a timely quality process improvement and a cost-effective strategy for performance improvement. Healthcare organizations must create an environment that decreases the chances for medication errors. Invariably, a medication error is the result of a system problem, so it is important

for organizations to create a supportive, non-punitive environment for those involved in errors so that they will report the errors. Leaders, managers, and staff all play vital roles in decreasing the number of medication errors.

As cited by Pape (2001), a medication error is any preventable medication-related event occurring as a result of actions by a healthcare professional that may cause or lead to patient harm while the patient is in the care of the healthcare provider. Criteria for what represents a medication error differ among institutions. Some hospitals define medication errors as those incidents when medications are: (a) omitted; (b) given at the wrong time; (c) given to the wrong patient; (d) the wrong dose; or (e) given by the wrong route (Roseman & Booker, 1995).

In 1999, the death rate associated with medication errors was estimated at 7,000 (Kohn et al., 1999). Of medication errors considered preventable, over half result in adverse drug events (ADEs). ADEs are defined as any response to a drug which is noxious, unintended, and which occurs at doses normally used in humans for the prophylaxis, diagnosis, or therapy of disease. It has been calculated that the excess cost of hospitalization attributable to an ADE to be $2,013 while others suggest the figure to be even greater, particularly for preventable ADEs (Classen, Pestotnik, Evans, Lloyd, & Burke, 1997).

An adequate supply of qualified nurses and pharmacists in hospitals is critical to safe and effective medication use. Current work-force shortages, combined with an increasing demand for the knowledge and skills that these professionals possess, have immediate and long-term implications on overall patient safety and quality of healthcare.

With these work-force shortages in mind, consider a few of the major problems in hospitals reported by the IOM (Kohn et al., 1999): unsafe and overly complex medication-use systems, lack of teamwork and communication among healthcare providers, poorly aligned incentives for reimbursement, inadequate application of science and technology, the need to better match patient care services with practitioner skills, and major deficiencies in professional education. These problems, coupled with work-force shortages, hinder the goal of fail-safe medication use in hospitals. Furthermore, if hospitals continue to use ineffective and antiquated approaches to the deployment of nurses and pharmacists, these problems are likely to get worse.

Human factors engineering (HFE) concepts and tools can help organizations go deeper in their analyses of adverse events and develop more effective and lasting remedies. HFE is the discipline that studies human capabilities and limitations and applies that information to designing safe, effective, and comfortable system design (Wickens, Lee, & Liu, 2003).

Applying HFE to healthcare design and safety issues is not new (Rappaport, 1970). By the end of the 1990s, many engineers and healthcare professionals were spreading the word about the key role of HFE in safe medical design (American National Standards Institute, 2001; Wiklund, 1995), healthcare facility operations (Welch, 1998), and patient safety processes (Gosbee, 2004).

An example of HFE in application was the unique opportunity of building a new hospital. The individuals planning St. Joseph's Community Hospital recognized the opportunity to increase patient safety and promote a patient-safe culture by improving the traditional hospital facility design process (Reiling et al., 2004). The new facility,

designed using safety-driven principles, reflects many innovative elements, including truly standardized patient rooms, new technology to minimize falls, and patient care alcoves for every patient room.

Initiated by the dramatic revelations of the IOM's (Kohn et al., 1999) report on patient safety and subsequent study of medical care delivered to Medicare beneficiaries by the Health Care Financing Administration, clinicians, administrators, and boards of directors have all become interested in the topics of patient safety and clinical quality (Kosel, Rosenstein, & Vance, 2001). While there appears to be universal agreement that much remains to be done to improve the care that patients receive, there is little data available indicating whether patient safety education for healthcare leaders has a direct impact on patient outcomes or whether such initiatives generate financial benefits for healthcare organizations. In an environment of shrinking patient revenues and increasing costs, making a sound case for the business model for investing in safety and quality programs has been a major challenge.

> Much of this challenge stems from a lack of solid information. This lack of information can take two forms: (a) failure to appreciate the scope of the problem, and (b) a lack of clinical and financial evidence that demonstrates what initiatives actually benefit the organization. (Kosel et al., p. 2)

Other studies point to organizational costs for patient safety as a major cause for concern (Weeks & Bagian, 2003; Weeks, Waldron, Foster, Mills, & Stalhandske, 2001). The studies argue that the long-term benefits to an organization's reputation, efficiency, and medico-legal defensibility compensate for up-front costs of implementation.

The first challenge, the lack of appreciation of the nature and scope of the problem, is rapidly being dispelled through publications like the IOM reports (IOM, 2001; Kohn et al., 1999). The second form of information deficit comes from a lack of studies that conclusively demonstrate the positive financial impact that safety-driven interventions can have on an organization's bottom line. From an organization's perspective, economic value is created when expenditures are reduced or revenues are generated. With regard to reducing or eliminating adverse events, most if not all of the financial impact comes from a reduction in expenditures in one of five areas:

Patient Safety-Related Expense Reductions:

1. Additional costs generated directly by the adverse event itself. These costs represent the largest single category of financial expenses.
2. Costs associated with complications arising from inadequate or poor quality.
3. Costs introduced through the inefficiencies inherent in substandard care.
4. Improved outcomes, as a result of eliminating adverse events, can be viewed as providing economic value to the organization. Improved outcomes can provide an organization with a competitive advantage in marketing its programs or securing managed care contracts.
5. Improved patient safety and clinical quality can help an organization avoid the tremendous liability suffered as a result of a medical mishap. (Kosel et al., 2001 p. 3)

Kosel et al. (2001) also noted the financial impact of ADEs. Among the studies examining the effect of reducing medication errors, those by Bates et al. (1997) and

Classen et al. (1997) are frequently cited as key testimonials to the kind of financial results that can be achieved with targeted interventions. Both studies looked at the relationship between ADEs, length of stay, and increased cost of hospitalization.

Classen et al. (1997) found that patients with ADEs had nearly triple the mortality rate of those without and an average increase in the length of their stay of 1.9 days. Additional hospital costs on average amounted to $2,262. Bates et al. (1997) reported an increase in length of stay of 2.2 days and some $4,685 in additional hospital costs per ADE. Both studies estimated that approximately a third of all ADEs were fully preventable, with direct savings ranging from $210,225 (Classen et al.) to $1,179,242 (Bates et al.).

There are additional studies on the financial impact of adverse medical/surgical events, with the research citing negative financial consequences for the healthcare organizations in which patients had developed pressure ulcers, surgical complications, and nosocomial infections (Kosel et al., 2001). These adverse events represent a financial drain on the organization that could be minimized or, in many cases, even eliminated with the right actions. Healthcare leaders must be educated and come to understand the extent of their liability exposure around patient safety.

In summary, adverse events are important markers of the quality of care in hospitals, so their prevention is critical to the quality improvement agenda. Some of the most common problems that occur in healthcare organizations are related to medication delivery. Of medication errors considered preventable, over half result in ADEs. It is important for the financial viability of healthcare organizations that they reduce or

eliminate adverse events to minimize costs associated with: (a) the event itself, (b) resulting complications, (c) inefficiencies, and (d) liability due to medical mishaps.

High-Reliability Organizations (HROs)

Complexity science is the study of complex living systems and complex organizations. Healthcare systems are complex and should be delivered by high-reliability organizations (HROs). Reliability is the extent to which an activity yields the same results on repeated trials. High reliability generates high dependability. An HRO is one in which many people can do the same thing safely, one in which processes can be safely repeated over time. In such an organization, dangerous work—including handling medications—can be performed at minimal risk to patients and healthcare workers (Oren, Shaffer, & Guglielmo, 2003).

One prerequisite to high reliability, according to experts in the field, is operational redundancy—the ability to provide for the execution of a task if the primary unit fails or falters. Redundancy is likewise a necessary characteristic of a safe medication-use system (Oren et al., 2003). High-reliability systems also include high level teamwork and avoidance of punitive approaches to errors by organizations. This is foundational to advance patient safety and the tools designed to support it (Malloch, 2007).

Processes used in an HRO should be replicable. Hospital size is no barrier to high performance. Small hospitals should be as capable of safe and effective medication use as tertiary medical centers are, provided that they follow similar principles (Oren et al., 2003). HROs are aware of the many system loopholes that exist within complex systems. They quickly identify opportunities for improvement, and, due to the fast pace that technology renders such documents obsolete, these recommendations are not necessarily

dependent on written policies. HROs work as a team to eliminate systems issues at the frontline. This sensitivity to frontline operations results in significant cost savings; solving problems as they occur is significantly less costly than solving them after they have existed over time (McKeon, Oswaks, & Cunningham, 2006).

HRO theory posits that accidents occur because individuals who operate and manage complex systems are themselves not sufficiently complex to sense and anticipate the problems generated by the system. Lessons learned from HROs indicate that a safety culture is supported by migrated distributed decision making, management by exception or negotiation, and fostering a sense of the big picture (Ruchlin, Dubbs, & Callahan, 2004).

One of the greatest challenges for any business organization is dealing with the unexpected. Good management of the unexpected is mindful management of the unexpected. That answer comes from careful study of organizations that operate under very trying conditions all the time and yet manage to have fewer than their fair share of accidents. These organizations, which are referred to collectively as HROs, include power grid dispatching centers, air traffic control systems, nuclear aircraft carriers, nuclear power generating plants, hospital emergency departments, and hostage negotiation teams (Weick & Sutcliffe, 2001). The better of these organizations rarely fail even though they encounter numerous unexpected events. They face an excess of unexpected events because their technologies are complex and their constituencies are varied in their demands—and because the people who run these systems have an incomplete understanding of their own systems and what they face.

Weick and Sutcliffe (2001) attributed the success of HROs in managing the unexpected to their determined efforts to act mindfully. This means that HROs organize themselves in such a way that they are better able to notice the unexpected in the making and halt its development. If HROs have difficulty halting the development of the unexpected, they focus on containing it. And if some of the unexpected breaks through the containment, they focus on resilience and swift restoration of system functioning.

Weick and Sutcliffe (2001) call this approach mindfulness, which means that HROs strive to maintain an underlying style of mental functioning that is distinguished by continuous updating and deepening of increasingly plausible interpretations of what the context is, what problems define it, and what remedies it contains. The key difference between HROs and other organizations is that managing the unexpected often occurs in the earliest stages, when the unexpected may give off only weak signals of trouble. The overwhelming tendency is to respond to weak signals with a weak response.

Weick and Sutcliffe (2001) focused on five hallmarks of organizations that persistently have less than their fair share of accidents. Together, these characteristics of HROs make up what they have termed mindfulness. They are: "(a) preoccupation with failure; (b) reluctance to simplify interpretations; (c) sensitivity to operations; (d) commitment to resilience; and (e) deference to expertise" (p. 10).

Mindfulness preserves the capability to see the significant meaning of weak signals and to give strong responses to weak signals. This counterintuitive act holds the key to managing the unexpected. By mindfulness, Weick and Sutcliffe (2001) meant the combination of ongoing scrutiny of existing expectations; continuous refinement and differentiation of expectations based on newer experiences; willingness and capability

to invent new expectations that make sense of unprecedented events; a more nuanced appreciation of context and ways to deal with it; and identification of new dimensions of context that improve foresight and current functioning.

In summary, healthcare should be delivered by HROs enabling many people to do the same thing safely and processes to be safely repeated over time. HRO theory posits that accidents occur because individuals who operate and manage complex systems are themselves not sufficiently complex to sense and anticipate the problems generated by the system. One of the biggest challenges for any business organization is dealing with the unexpected. Good management of the unexpected is mindful management of the unexpected. The key difference between HROs and other organizations is that managing the unexpected often occurs in the earliest stages, when the unexpected may give off only weak signals of trouble, when, as mentioned previously, the tendency is toward weak response.

Healthcare Leadership

Conway (2000a) noted that healthcare leadership contains in its ranks extraordinary professionals committed to high-quality care and continuous improvement. Many healthcare workers do not believe their leaders are sufficiently interested in patient safety. There are many reasons, but chief among them is the lack of leadership visibility when it comes to error and safety. Outside of "high-level" statements of values, leaders are not often seen or heard publicly—inside or outside of their institutions—addressing specific trends in system failures (Conway, 2000a). Whatever the reason, when errors are discovered, orders seem to come down from the top, and fact-finding and action planning

are done secretly. Learning about incidents remains limited to a very few people in this model.

Healthcare in the United States is excellent but not perfect. Everyone knows that errors, slips, and near-misses occur routinely in healthcare organizations. Yet few know how often they happen, what their outcomes are, or what is being done to prevent recurrence. Healthcare leaders can send a strong message emphasizing their understanding of the realities of practice and applying their personal leadership to improve safety (Conway, 2000a).

Healthcare leaders face challenges from many different arenas—business, finance, and patient care. One resource often overlooked as a strategic asset is the hospital board of directors. Too often, hospital boards erroneously assume or are forced into the roles of either micro-management or crisis management. Board education, which focuses on pertinent healthcare market information and strategic decision making, can help board members understand their roles (Dulworth, 2003). As part of its overall plan, hospital leadership should ensure that its board members understand the market environment and its effect upon the hospital's strategic directions, options, and priorities (Dulworth).

Selberg and Doerr (2004) reported that their hospital's journey toward developing a climate of safety required a culture change that affected the entire health system. This culture change was focused on the following initiatives: (a) the patients will be the safest and most satisfied in the country; (b) the employees and medical staff will be the most dedicated in the nation to treating patients; (c) the health system will have exceptional clinical outcomes; and (d) the health system's board will demonstrate outstanding

stewardship of resources. Selberg and Doerr noted that the culture change required to achieve these lofty goals must begin with the administrative leadership and the board of directors. The directors must go beyond their traditional boundaries of fiscal responsibility and realize their accountability for fostering a safer clinical environment. Board members must develop an understanding of their hospital's clinical environment and learn to improve it. Selberg and Doerr's health system implemented a shadowing program in which board members observed the work of hospital employees as means for gaining a greater understanding of the hospital environment. The shadowing program was initiated in August 2003 and has involved all 16 board members, all senior executives, and the CEO. Board members, assigned to "shadowees" from the health system's two hospitals, covered the entire organization, becoming virtual employees for part of a shift and experiencing the challenges, frustrations, and rewards of patient care.

> These experiences helped the board understand that to become the best in the nation, there had to be a change in the leadership's commitment to a system of accountability. It created a clinical environment that inspired all staff to place the patient at the center of their efforts. (Selberg & Doerr, p. 4)

Frankel, Gandhi, and Bates (2003) noted that patient safety has moved up the list of priorities for hospitals, but improving safety across a large organization is challenging. The authors of this article sought to create a common patient safety strategy for the Partners HealthCare system, a large, integrated, non-profit healthcare delivery system in the United States. The health system identified a central patient safety officer, who then formed a patient safety advisory group with local expert members, as well as a patient safety leaders group comprised of personnel responsible for patient safety at each

member institution. The latter group met monthly to help determine future projects and to share the result of piloting and implementation. There was a broad consensus that intervention should include the areas of culture change, process change, and process measurement. Key milestones to date include implementation of Executive WalkRounds (the management team does walking rounds on an ongoing basis of the health system's units), development of accountability principles, agreement to create a common systemwide adverse event reporting system, and agreement to implement computerized physician order entry in all hospitals, which will decrease errors from physicians' illegible handwriting (Frankel et al.). These efforts have heightened awareness of patient safety considerably within the network. The participation of the senior leaders of the hospitals, in particular, has resulted in substantial support for patient safety initiatives (Frankel et al.).

The publication of *To Err is Human* (Kohn et al., 1999) has highlighted concern for patient safety. Attention to date for patient safety has focused primarily on micro-issues such as minimizing medication errors and adverse drug reactions, improving select aspects of care, and reducing diagnostic and treatment errors. However, attention is also required to a macro-issue—an organization's culture and the level of leadership required to create a culture. Normal accident theory asserts that errors result from system failures (Ruchlin et al., 2004). An important element of this perspective is the need for a safety system or culture.

Reason (2000) delineated an important component of a safety culture: an information system that collects, analyses, and disseminates information from incidents and near misses as well as regular proactive checks on the system's vital signs. These

activities make up an *informed culture*—one in which those who manage have current knowledge about the human, technical, organizational, and environmental factors that determine the safety of the system as a whole.

To create an informed culture, Reason (2000) postulated that four subcultures must be established. First, it is important to design a *reporting culture*—an organizational climate in which people are prepared to report accidents and near misses. An effective reporting culture depends in turn on how an organization handles blame and punishment. Thus, a *just culture* is needed. A just culture features an atmosphere of trust in which people are not only encouraged to provide, and even rewarded for providing, essential safety-related information, but also in which there are clear lines drawn between acceptable and unacceptable behavior. Flexibility is key, particularly the ability to reconfigure in the face of high-tempo operations or certain kinds of danger. A *flexible culture* takes a number of forms, but in many cases it involves shifting from the conventional hierarchical mode to a flatter professional structure in which control passes to task experts on the spot and then reverts back to the traditional bureaucratic mode once the emergency has passed. Such adaptability depends crucially on respect. Respect must be earned, and this requires a major training investment on the part of the organization. Finally, an organization must possess a *learning culture,* which is characterized by "the willingness and the competence to draw the right conclusions from its safety information system and the will to implement major reforms when their need is indicated" (Reason, 2000, p. 768).

Despite the emphasis on patient safety in healthcare, few organizations have evaluated the extent to which safety is a strategic priority or to which their culture

supports patient safety. In response to the IOM's report (Kohn et al., 1999) and to an organizational commitment to patient safety, Pronovost et al. (2003), based on a systematic assessment of safety at the Johns Hopkins Hospital, developed a strategic plan to improve safety. The specific aims were to evaluate the extent to which the culture supported patient safety at Johns Hopkins and the extent to which safety was deemed a strategic priority. Their study was one of the first large scale efforts to measure an institutional culture of safety and a follow-up design in healthcare improvements. The survey results suggested that strategic planning for patient safety was needed. Several efforts to improve their culture of safety were initiated based on these results, which should lead to measurable improvements in patient safety.

Healthcare leaders need to create organization-wide systems to identify and eliminate hazards that pose risks to patients. However, leaders' ability to do so depends upon their ability to create a culture that supports patient safety. Specific behaviors that leaders can demonstrate include the following:

> (a) promoting the view that patient safety is everyone's responsibility; (b) encouraging open communication among leaders, staff, and patients regarding safety concerns; (c) empowering staff to identify and reduce threats to patient safety; (d) allocating resources for safety; and (e) educating staff on the science related to safety. (Pronovost et al., 2004, p. 59)

At Johns Hopkins Hospital, the patient safety committee created a safety program that focused on encouraging staff in selected units to identify and eliminate potential errors in the patient care environment (Pronovost et al., 2004). As part of the program, senior hospital executives each adopted an intensive care unit and worked with the unit

staff to identify issues and to empower staff to address issues. According to Pronovost et al. (2004),

> the program consisted of [seven] steps, which together required 6 months for implementation: (a) conduct a culture survey; (b) educate staff on the science of safety; (c) identify staff safety concerns through a staff safety survey; (d) implement the senior executive adopt-a-work unit program; (e) implement improvements; (f) document results, share stories, and disseminate results, and (g) resurvey staff. The senior executive adopt-a-work unit program was successful in identifying and eliminating hazards to patient safety and in creating a culture of safety. (p. 59)

Mohr et al. (2002) noted that one hospital had a vision to become the safest children's hospital in the world. This vision was backed by a commitment to make safety the highest priority from the board down. This hospital developed "champions" among the senior leadership and established an infrastructure for safety. This included education and training, dissemination, and the creation of an organizational culture that enabled "blame-free" reporting and learning errors.

Prybil (2003) surveyed 35 CEOs, of whom 29 responded to the question (p. 1), "As a CEO in the contemporary healthcare environment, what do you see as the two or three greatest challenges that confront you and your organization as you strive to carry out its mission?" The challenges cited most frequently were ensuring patient safety and good clinical outcomes; reducing variability in quality and costs; and demonstrating positive impact on the health status of individuals, families, and communities (Prybil).

Healthcare organizations are not immune to the challenges associated with long-term organizational effectiveness faced by any industry. Organizations need to be led, but they also need to be managed. Weisbord (1976) identified six places to look for trouble when diagnosing organizational problems—purpose, structure, rewards, helpful mechanism, relationships, and leadership. The role of leadership is to keep all these elements in balance.

Cohen, Eustis, and Gribbins (2003) noted that fundamental change—at both the individual and structural levels—is needed to bring a culture of quality and safety to hospitals. Changing individual behavior requires motivators (as incentives) and the "unfreezing" of the individual's preference for the status quo (Cohen et al.). In terms of structural change, an organization must change its focus from its existence or costs to outcomes.

In early 2000, the leadership of Good Samaritan Hospital, a community teaching hospital in Dayton, Ohio, made patient safety a strategic priority and devoted resources to incorporate safety as a part of the hospital's culture and care processes. To assess the hospital's progress toward achieving three aims—demonstrating patient safety as a top leadership priority, promoting a non-punitive culture for sharing information and lessons learned, and implementing an integrated patient safety program throughout the organization—the Safety Board rated the hospital's performance bimonthly, using a 5-point-scaled self-assessment tool (Wong, Helsinger, & Petry, 2002). This administrative structure provided the leadership the momentum necessary to change the way that patient safety issues are perceived and acted on throughout the organization. To err may be human, but so is the ability to increase patient safety awareness, to promote

cultural change within existing systems, and to improve the patient care processes and outcomes (Wong et al.).

Weingart, Farbstein, Davis, and Phillips (2004) conducted a culture of safety survey to study features of the safety culture and their relationship to patient safety indicators. The study design consisted of anonymous written surveys collected from 455 of 1,027 (44%) workers at four Massachusetts hospitals. Respondents characterized their organizations' patient safety, workplace safety, and features of a safety culture, such as leadership, commitment, professional salience, presence of a non-punitive environment, error reporting, and communication. The results of the survey were that employees universally regarded patient safety as an essential part of their job. Two-thirds of workers worried at least once a day about making a mistake that could injure a patient; and 43% said that their workload hindered their ability to keep patients safe. Independent indicators of patient safety did not line up neatly with safety culture survey results. Incident reporting rates correlated directly, while adoption of best practices and expert opinion varied inversely with survey results. The safety culture is a complex phenomenon that requires further study (Weingart et al.).

An important component in the education of healthcare leaders on patient safety issues is the consideration of the culture of the organization. Culture refers to the shared assumptions that a group has learned throughout its history (Wilson, 2001). Changing culture in healthcare is complex. Professionals have assumptions that drive their behaviors, as do organizations. Cultural assumptions underlie how an organization defines mission, strategies, and goals, as well as structures and processes. Cultural assumptions also influence relationships, authority, and how rewards and status are

allocated. Judging employees positively for working long hours reinforces a cultural assumption that hard work is good, which is at odds with evidence that shows fatigue increases the likelihood of human error. If teamwork is espoused but individual performance strongly rewarded, changing the culture requires a clear shift to rewarding team behaviors. Changing culture to support patient safety begins with building awareness in a complex, high-risk service industry in need of transformational change. Once acceptance of the need for change occurs, the behavior changes required to achieve the ideal state must be described. Wilson identified 10 such critical behaviors:

1. Demonstrate patient safety as a top leadership priority.
2. Actively promote a non-punitive environment for sharing information and lessons learned.
3. Routinely assess risk to patient outcomes.
4. Evaluate the competitive/collaborative environment for partners from whom one can learn and share information.
5. Analyze adverse events and identify themes across events.
6. Reward and recognize safety-driven decisions and reporting.
7. Foster effective teamwork, regardless of authority, through team training and simulation.
8. Implement care delivery processes that avoid reliance on memory.
9. Implement care delivery processes that avoid reliance on vigilance.
10. Engage patients and caregivers in the design of care delivery processes.

(p. 82)

Americans tend to believe clinicians are solely responsible for the quality of care. Healthcare systems are extremely complex and with that complexity comes the need to view safety as the product of the interaction of people, procedures, and processes within the culture and subcultures of the organization (Wilson).

In 1997, the Veterans Health Administration recognized medical errors as a significant issue and began a number of patient safety initiatives to address these problems. One such effort involved the creation of the National Patient Safety Center. Its priority agenda item was to create a culture of safety. The National Patient Safety Center's full patient safety program was tested and implemented throughout the Veterans Health Administration system from November 1999 to August 2000 (Hallam, 2000; Heget, Bagian, Lee, & Gosbee, 2002). Core concepts of the approach included a systemwide focus; a non-punitive approach to patient safety activities that emphasized systems-based learning; the active seeking out of close calls, which were to be viewed as opportunities for learning and investigation; and the use of interdisciplinary teams to investigate close calls and adverse events through a root cause analysis process. The purpose of the safety program was to sensitize people to the frequency and severity of adverse events and close calls and encourages acceptance of the fact that humans can never be perfect and may err. However, the program also showed healthcare providers that systems can be changed to reduce the potential that harm will occur to patients during care provision (Heget et al.).

One of the most telling measures of success of the National Patient Safety Center's patient safety program is the dramatic increase in the number of adverse event and close call reports submitted to the Center that result in effective preventive actions.

Before program implementation, close call reports represented less than 0.10% of the total events reported in the Veterans Health Administration. Although many healthcare systems do not report close calls at all, safety experts maintain that a healthy system from a safety perspective will have a high percentage of reported close calls as a proportion of total events reported. Close calls can provide an accurate picture of what actually occurs in an organization and have been shown to be anywhere from 3 to 300 times more common than actual adverse events. Following program implementation, National Patient Safety Center saw a 30-fold increase in all events reported to it and a 900-fold increase in reporting of close calls of high-priority events (Heget et al., 2002).

If the next phase of the evolution of the patient safety movement is to succeed, it must be grounded in widespread and in-depth education of all healthcare professionals (Barach & Berwick, 2003). A large body of disparate knowledge must be integrated, translated, and embedded in practice before changes in individual and organizational behavior can be sustained. Education must address systems evaluation, mishap analysis, human factors, teamwork, safety, culture, and professionalism (Barach & Berwick). The tools for delivering this education should include multimedia, small-group facilitated discussion, problem-based learning, and simulation-based exercises with videotape feedback. Only through innovative methods that encompass active learning, role modeling, and feedback can structural changes be fully realized (Barach & Berwick).

The primary responsibility of healthcare organizations is to help individuals obtain or return to health and wellness (Joint Commission Resources, 2003). To do this, organizations and their staffs must provide safe, appropriate care to the patients they serve. The Joint Commission strongly advocated that to ensure patient safety,

organizations must establish a culture in which errors are proactively identified, staff can feel free to report incidents, and safety is rooted in the daily work of individual healthcare professionals and other staff. Some ways in which the Joint Commission has worked to help organizations create this culture of safety include:

1. Developing patient safety standards;
2. Establishing National Patient Safety Goals;
3. Developing Shared Visions—New Pathways; the Joint Commission's new accreditation process initiative;
4. Setting state-of-the-art standards;
5. Maintaining and mining the Sentinel Event database;
6. Issuing *Sentinel Event Alert*;
7. Providing opportunities for consumer feedback through its Office of Quality Monitoring; and
8. Supporting safety-related legislative initiatives.

The Joint Commission has made patient safety a centerpiece of its accreditation activity and has developed and implemented new patient safety standards with which accredited organizations must be in compliance, including the National Patient Safety Goals, developed annually by an expert advisory panel (Jacott & Jacott, 2003).

Many changes in the leadership function deal with ensuring that safety is a high priority in healthcare organizations. Leaders also need to work with the directors of relevant departments and encourage communication and cooperation among all staff to implement ways to improve patient safety. Leaders must allocate financial, information, physical, and human resources to improvement activities in this area and regularly

evaluate whether these resources are adequate. In addition, leaders need to evaluate how effective their own performance has been in organization-wide efforts to improve patient safety (Joint Commission Resources, 2002, 2003).

The role of the leaders is to define and communicate the purpose of the organization clearly and establish the work of practice teams as being of highest strategic importance (IOM, 2001). Leaders must be responsible for creating and articulating the organization's vision and goals, listening to the needs and aspirations of those working on the front lines, providing direction, creating incentives for change, aligning and integrating improvement efforts, and creating a supportive environment and a culture of continuous improvement that encourage and enable success (IOM).

Learning organizations need leadership at many levels that can provide clear strategic and sustained direction and a coherent set of values and incentives to guide group and individual actions. Leaders of healthcare organizations may need to provide an environment for innovation that allows for new and more flexible roles and responsibilities for healthcare workers. Leaders need to provide such an environment because the learning adaptation and incorporation of best practices necessary to bring about engineering changes requires energy that is scarce in a demanding and rapidly changing environment (IOM, 2001).

According to the IOM (2001) leaders of healthcare organizations must fill a number of specific roles. First, they must identify and prioritize community health needs and support the organization's ability to meet these needs. Second, leaders can help obtain resources and respond to changes in the healthcare environment, which have been rapid and unrelenting. Leaders must ensure that their organization has the ability to

change. Leadership should support innovation and provide a forum so that individuals can continuously learn from each other. Organizations must invest in innovation and redesign. Third, and perhaps the most difficult leadership role, is to optimize the performance of teams that provide various services in pursuit of a shared set of aims. Fourth, leaders can support reward and recognition systems that facilitate coordination of work across sets of services as necessary. Fifth, leaders need to reinvest in their workforce to help them achieve their full potential, both individually and as teams, in serving their patients. Finally, leaders must recognize the interdependence of changes at all levels of the organization—individual, group or team, organizational, and interorganizational (IOM).

While patient care in hospitals is the responsibility of the multidisciplinary, multi-level healthcare team, the primary responsibility for inpatient care rests with nursing leadership. Nurse leaders and practicing nurses alike must understand that errors are rarely the fault of a person; rather, errors are the end result of systems of care, for example, new technology, changes in staffing mix, and medication issues. Given the essential role of nurses in healthcare delivery, including responsibility for advocating in the interests of patients, nurses are critical to changing the culture of organizations and redesigning systems so that nursing care specifically, and healthcare more broadly, are as safe as possible (Maddox, Wakefield, & Bull, 2001).

In summary, there are many extraordinary professionals in healthcare leadership who are committed to high-quality care and continuous improvement. Healthcare leaders face challenges from many different arenas—business, finance, and patient care. The hospital board of directors can serve as a resource and strategic asset to promote a culture

of safety in the organization. Changing culture in healthcare is complex. Cultural assumptions underlie how an organization defines mission, strategies, and goals, as well as structures and processes. Changing culture to support patient safety begins with building awareness in a complex, high-risk service industry in need of a transformational change. Leaders must ensure that the organization has the ability to change. Although patient care in hospitals is the responsibility of the multidisciplinary healthcare team, the primary responsibility for inpatient care rests with nursing leadership.

Nursing Leadership and Practices

A large percentage of the healthcare workers in an organization are nurses, so it is critical that nursing leaders are aware of the nurse's role in patient safety. In a new report released by the IOM (Page, 2004), patient safety continues to be endangered in healthcare organizations across the country, and a key factor in this risk is the nursing work environment in which patients receive care. This report, *Keeping Patients Safe: Transforming the Work Environment of Nurses*, notes that licensed nurses and nursing assistants make up 54% of all healthcare workers. They are the first line of defense in keeping patients safe, and the less nursing time provided to patients, the poorer the outcomes are likely to be. However, the overall conditions under which many nursing staff function are not conducive to delivering effective, safe care and services (Page).

The recommendations for modifying nurses' work environments to help them provide safer care are based on a study conducted by the IOM Committee on the Work Environment for Nurses and Patient Safety. The committee found that the characteristics of the four major components of all healthcare organizations—management practices,

workforce deployment, work design, and organizational culture—all endangered patient safety (Page, 2004; Simpson, 2004).

Until recently, few people understood that the availability of nurses is a major determinant of health outcomes and reason why health outcomes vary among hospitalized patients. Establishing how exactly nurses affect patient safety and outcomes could ensure that local and national policies reflect the need for adequate nurse staffing. Empirical research has been done by Linda Aiken, and her colleagues at the Center for Health Outcomes and Policy Research at the University of Pennsylvania, including studies exploring the relationships among nurses' educational levels (Aiken, Clarke, Cheung, Sloane, & Silber, 2003; Aiken, Clarke, Silber, & Sloane, 2003; Long, Bernier, & Aiken, 2004), working hours (Rogers, Hwang, Scott, Aiken, & Dinges, 2004), job dissatisfaction and burnout (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002); nurse staffing (Aiken, 2001; Aiken, Clarke, & Sloane, 2001, 2002; Clarke & Aiken, 2003), the work environment (Aiken, 2002, 2003; Aiken, Clarke, Sloane, & Sochalski, 2001; Aiken, Clarke, Sloane, Sochalski, et al., 2001; Rafferty, Ball, & Aiken, 2001) and the impact that those conditions have on patients' health outcomes with some statistically significant findings. Aiken and colleagues utilized large databases and included cross-national samples. They found that many nurses are working mandatory overtime due to the escalation of the shortage of registered nurses. The researchers concluded that the risks of making a medical error were significantly increased when work shifts were longer than 12 hours, when nurses worked overtime, or when they worked more than 40 hours per week.

Page (2004) noted further that no state or federal regulations restrict the number of hours a nurse may voluntarily work in a 7 day period. Furthermore, 40% of hospital nurses have burnout levels that exceed the norms for healthcare workers. Job dissatisfaction among hospital nurses is four times greater than the average for all U.S. workers and 1 in 5 hospital nurses report that they intend to leave their current jobs within a year. Clarke and Aiken (2003) applied a measure of hospital performance known as "failure to rescue" in nursing research for the first time. Failure to rescue describes clinicians' inability to save a hospitalized patient's life when he experiences a complication (a condition not present on admission). Because nurses are often the first to detect early signs of possible complications, their vigilance makes timely rescue responses more likely. In any hospital, the quality of nursing surveillance depends largely on management's hiring and staffing decisions. A low nurse-patient ratio and a greater proportion of registered nurses relative to other nursing personnel are both crucial to effective surveillance (Aiken, Clarke, Sloan, Sochalski, et al., 2002). This is relevant not only for staff nurses, but also for those responsible for staff development, quality assurance, and nurse educators. Failure to rescue has clear implications for administrators and policymakers as well. Perhaps the most important will be how it affects efforts to justify lower nurse/patient ratios and improve nurses' work environment. Patient safety in hospitals hinges on the ability to recruit and retain sufficient numbers of qualified nurses, adequately supervise and mentor novice staff, and shape a supportive practice setting.

Tucker and Edmondson (2003) conducted a detailed study of hospital nursing care processes to investigate conditions under which nurses might respond to failures they encounter in their hospital's operational processes by actively seeking to prevent

future occurrences. Their research suggests that, in spite of increased emphasis on these issues, hospitals are not learning from the daily problems and errors encountered by their workers. Process failures are not rare but rather are an integral part of working on the front lines of healthcare delivery (Tucker & Edmondson).

Tucker and Edmondson (2003) identified two types of process failures—problems and errors. They defined an error as the execution of a task that is either unnecessary or incorrectly carried out and that could have been avoided with appropriate distribution of pre-existing information. The second failure type, a problem, they defined as a disruption in a worker's ability to execute a prescribed task because either something the worker needs is unavailable at the time or in the location, condition, or quantity desired and, hence, the task cannot be executed as planned; or something is present that should not be that is interfering with the designated tasks. Like errors, problems are a valuable source of information about ways in which the system is not working.

Research on quality improvement has distinguished between two types of responses to problems—short term remedies that "patch" problems and more thorough responses that seek to change underlying organizational routines to prevent recurrence (Tucker & Edmondson, 2003). Tucker and Edmondson found that the lack of organizational learning from failures can be explained by three reasons that can even be considered counterproductive:

> (a) an emphasis on individual vigilance in healthcare, which is an industry norm that encourages nurses and other health professionals to take personal responsibility to solve problems as they arise (a model explicitly developed and highly valued in healthcare organizations); (b) a unit efficiency model which

> leads to an organizational design in which workers do not have time to resolve underlying causes of problems that arise in daily activities; and (c) empowerment or a widely shared goal of developing units that can function without direct managerial assistance. The flipside of empowerment, however, is the removal of managers and other non-direct labor support from daily work activities, leaving workers on their own to resolve problems that may stem from parts of the organization with which they have limited interaction. (p. 64)

Tucker and Edmondson estimated that worker-wasted time in work-arounds to cope with system failures consumed 8% of a shift, which, conservatively, amounts to $256,000 per year in lost nursing time for a 200-bed hospital.

Both errors and problems can be detected and used as launching points for organizational learning and improvement by motivating changes to avoid recurrence. Nurses as front-line healthcare providers are in the best position to discover and remove this type of work system failure. Nursing leaders have several essential roles: assisting with problem-solving efforts, providing support for workers who attempt to improve their work systems, and valuing them as motivated employees (Tucker & Edmondson, 2003). By reforming workers' perceptions of failures from sources of frustration to sources of learning, healthcare leaders can engage employees in system improvement efforts that would otherwise not occur. Given the key role that nurses play in assuring patient safety, it is important to examine how and to what extent their academic program prepares them for this responsibility.

In summary, a large percentage of healthcare workers in an organization are nurses, so it is critical that nursing leaders are aware of the nurse's role in patient safety.

Patient safety continues to be endangered in healthcare organizations across the country, and a key factor in this risk is the nursing work environment in which patients receive care. Empirical studies have been conducted by nurse researchers with statistically significant findings among nurses regarding their impact on patients' health outcomes. Other research has been conducted on nursing environments, process failures, and the opportunity for organizational learning and improvement.

Patient Safety and the Nursing Curriculum

There is little evidence that undergraduate or post-graduate programs provide students with the skills necessary to examine patient safety issues as an integral part of their practice. These issues need to be addressed across the broad spectrum of educational curricula designed to prepare healthcare students. Although more research is required in this respect, the clear evidence of medical errors affecting patients suggests that professionals are insufficiently prepared to control risks (Wakefield et al., 2005).

VanGeest and Cummins (2003) conducted an educational needs assessment among physicians and nurses with findings that suggest that new skills can be taught to health professionals using a systematic approach and a comprehensive curriculum, but other actions are clearly required including: (a) changes in organizational culture; (b) the need for healthcare leaders to publicly demonstrate their commitment to reducing medical errors; and (c) organizations' promotion of learning and application opportunities on patient safety for physicians and nurses.

There is currently more literature available on patient safety curriculum in medical students' programs than for nursing students' programs. One medical student program, for example, has successfully implemented a comprehensive and

multidisciplinary safety curriculum to address the U.S. Accreditation Council for Graduate Medical Education's (ACGME) core competencies and to establish a culture of safety for sustainable improvement in healthcare through integration of safety into the students' daily activities (Singh et al., 2005). A needs assessment conducted by Singh et al. consisting of a 15-minute quiz assessing students' knowledge and prior exposure to patient safety issues indicated that few had received any formal safety training and all had a poor knowledge base. The patient safety objectives that the program addressed through the ACGME competencies were patient care, medical knowledge, practice-based learning, communication skills, professionalism/ethics, and system-based practice (Singh et al.).

Patient safety contains many new concepts and introduces learners to new ways of thinking about themselves, their colleagues, and their practices. Active learning plays an important role by forcing learners to research topics in more detail and apply them to real-life situations (authentic tasks). The medical student program emphasized active learning and experiential activities to reinforce the safety principles taught, including journals, case presentations, use of palm-base drug formulary software, chart audits, staff surveys, response to video clips, simulated charts, and standardized patient interviews with the goal of assisting the students to internalize patient safety practice (Singh et al., 2005).

Madigosky, Headrick, Nelson, Cox, and Anderson (2006) studied the effects of a patient safety and medical fallibility curriculum on 2nd-year medical students. The students completed a knowledge, skills, and attitudes questionnaire before the curriculum, after the final learning experience, and 1 year later. The curriculum led to

changes in the medical students' knowledge, skills, and attitudes, but not all of the changes were sustained at 1 year, were in the desired direction, or were supported by their self-directed behaviors.

There is not currently a comprehensive patient safety curriculum for nursing students like the core competencies that have been put forth for medical students by the ACGME. Many states have indicated that nurses must complete a medical error course for their licensure renewal. For example, Florida mandates that all nursing licensees in the state complete a 2-hour course on prevention of medical errors that meets prescribed criteria including: (a) factors that impact the occurrence of medical errors; (b) recognizing error-prone situations; (c) processes to improve patient outcomes; (d) responsibilities for reporting; (e) safety needs of special populations; and (f) public education (Florida Department of Health, 2006). This underscores the need for a patient safety curriculum that can be uniformly adopted by nurse educators in the effort to graduate safer practitioners and improve health outcomes.

There is a demand for improved patient care outcomes and a safer healthcare delivery system that is forcing nurse leaders to re-examine current nursing education and practice environment models. Competence, education, and skills play a critical role in achieving safe patient care outcomes so there must be an effort to transform the education of nurses for today's complex healthcare environment. Assuring the best possible patient care outcomes and understanding how to effectively and efficiently use nurses according to their levels of knowledge, education, and skills will be paramount. To this end, the American Association of Colleges of Nursing has taken steps to move forward with the creation of a clinical nurse leader role. The nurse leader is a master's

degree level generalist and is responsible for improving clinical health outcomes and enhancing nursing practice through the identification and application of evidence-based practice to care for clients and families (Bartels & Bednash, 2005).

Quality and safety competencies are addressed in nursing accreditation guidelines (American Association of Colleges of Nursing, 1998). In response to the urgent calls to transform healthcare delivery and better prepare today's nurses for professional practice, the American Association of Colleges of Nursing Task Force on the Essential Patient Safety Competencies for Professional Nursing Care recently identified core competencies that should be achieved by professional nurses to ensure high-quality and safe patient care and will continue as guidelines in *The Essentials of Baccalaureate Education for Professional Nursing Practice* (American Association of Colleges of Nursing, 2006). Strategies on instructional methodologies and appropriate assessment of learning outcomes for the core competencies are lacking, and there are few, if any, examples of schools that have implemented a comprehensive quality and safety curriculum (Cronenwett et al., 2007).

In summary, there is little evidence that undergraduate or post-graduate programs provide students with the skills necessary to examine patient safety issues as an integral part of their practice. There is currently more information available on patient safety curriculum in medical students' programs than for nursing students' programs. There is not currently a comprehensive patient safety curriculum for nursing students such as the core competencies that have been put forth for medical students by the ACGME. There is a demand for improved patient care outcomes and a safer healthcare delivery system, which is forcing nurse leaders to re-examine current nursing education and practice

environment models. Competence, education, and skills play a critical role in achieving safe patient care outcomes, thus there must be an effort to transform the education of nurses to meet the needs of today's complex healthcare environment.

Patient Safety Curriculum Research

E. L. Smith et al. (2007), as part of the Robert Wood Johnson Foundation funded QSEN project, conducted a survey to assess levels of integration of quality and safety content in pre-licensure nursing curricula. The results of the survey of 195 nursing program leaders indicated that, at face value, there were high percentages of schools that reported inclusion of the QSEN core competencies (patient-centered care, teamwork and collaboration, and safety) using a variety of pedagogical strategies. Greater numbers of schools (but still a minority) reported that they would like more content in informatics, quality improvement, and evidence-based practice. Cronenwett et al. (2007) reported, however, that the QSEN faculty focus groups, upon reviewing the knowledge, skills, and attitudes for the competencies, had markedly different reactions from the survey data reported by E. L. Smith et al. According to Cronenwett et al.:

> Although the faculty agreed that they *should* be teaching these competencies and, in fact, had thought they *were*, focus group participants did not understand fundamental concepts related to the competencies and could not identify pedagogical strategies in use for teaching the KSAs. (p. 126)

Salmon (2007) identified the need for nursing to advance its own professional contributions through building on the shared values and commitments common to health professions, including advocacy, quality, and safety, which will require competencies beyond those found in today's curricula. There apparently is a disconnect between what

faculty say they teach and how the nursing graduates practice. Bridging this gap requires new ways of thinking, interacting, and learning (Bargagliotti & Lancaster, 2007).

In addition to the curriculum, attention must be also paid to the instructional design. The critical thinking and problem-solving skills necessary to recognize and remediate errors and problems are best taught through andragogical practices rather than traditional pedagogical practices that are typically used in college environments. Ebright, Urden, Patterson, and Chalko (2004) studied the human performance factors that characterized novice (newly graduated) nurse near miss/adverse event situations in acute-care settings with findings that suggested the nurses need support in the area of major themes, such as: (a) clinically focused critical thinking; (b) seeking assistance from experienced nurses; and (c) knowledge of unit and workflow patterns; (d) first-time experiences; (e) time constraints; (f) hand-offs; (g) influence of peer pressure and social norms; (h) losing the big picture; and (i) novice assisting novice. Arguing that critical thinking must be studied and practiced in its own right, van Gelder (2005) stated that it must be an explicit part of the curriculum: Unless students did the thinking for themselves, they would never improve their skills.

In summary, nursing research indicates that there is a disconnect between what faculty say they teach and how the nursing graduates practice. Adult learning concepts such as experiential learning, discourse, critical reflection, and problem-solving skills can serve to bridge this gap to bring the needed competencies to nursing students in the patient safety curriculum.

Adult Learning Concepts

Adult learning frameworks are conducive to the effective delivery of a patient safety curriculum for nursing students. The concept of *andragogy* (the art and science of helping adults learn) was proposed by Malcolm Knowles (1980, p. 43). Influenced by the thinking of Eduard Lindeman, Cyril O. Houle, Carl Rogers, and Kurt Lewin (M. K. Smith, 2002), Knowles was convinced that adults learned differently from children—and that this provided the basis for a distinctive field of inquiry. Knowles' work was based on five crucial assumptions about the characteristics of adult learners that are different from the assumptions about child learners upon which traditional pedagogy is premised: (a) self-concept, (b) experience, (c) readiness to learn, (d) orientation to learning, and (e) motivation to learn (1984, p. 12). He suggested that the classroom climate should be one of "adultness," both physically and psychologically; there should be "mutuality between teachers and students"; and that adult students should be self-directed in the planning, implementation, and evaluation of their learning experiences (Knowles, 1980, p. 47). Knowles argued that adult learning should produce at least these outcomes:

> (a) adults should acquire a mature understanding of themselves; (b) adults should develop an attitude of acceptance, love, and respect toward others; (c) adults should develop a dynamic attitude toward life; (d) adults should learn to react to the causes, not the symptoms, of behavior; (e) adults should acquire the skills necessary to achieve the potentials of their personalities; (f) adults should understand the essential values in the capital of human experience; and (g) adults should understand their society and should be skillful in directing social change. (1950, pp. 9-10).

All of these components are needed in the instructional methodology of nursing students.

Transformational learning theory has taken center stage since the late 1980s. First articulated by Jack Mezirow in 1978, transformational learning theory is about change—the "dramatic, fundamental change in the way we see ourselves and the world in which we live" (Merriam & Caffarella, 1999, p. 318). Transformational learning centers more on the cognitive process of learning. The mental construction of experience, inner meaning, and reflection are common components of this approach.

The process of transformative learning is firmly anchored in life experience. All human beings have a need to understand their experiences, to make sense of what is happening in their lives. Mezirow's (1997) position was that no need was more fundamentally human than the need to understand the meaning of one's experience. Transformative learning develops autonomous thinking. It is the process of effecting change in a frame of reference. Adults have acquired a coherent body of experience—associations, concepts, values, feelings, conditioned responses—frames of references that define their life world. They selectively shape and delimit expectations, perceptions, cognition, and feelings. When circumstances permit, transformative learners move toward a frame of reference that is more inclusive, discriminating, self-reflective, and integrative of experience (Mezirow, 1997). Although Kolb (1984) defined reflection as an element of a learning cycle, Brookfield (1987) suggested that it is the link to critical thinking. To encourage critical reflection, an instructor may have people engage in role plays or another technique that involves a method of journal writing. Although experience is at the core of learning in healthcare, reflection is integral to deeper learning from experience. Skillful reflectors are critical thinkers, and critical thinking is the basis

for effective clinical decision-making, which is at the heart of quality healthcare. The skill of reflection is not inborn; it is learned over time and with practice (Plack & Greenberg, 2005).

A frame of reference encompasses cognitive, conative, and emotional components, and is composed of two dimensions: habits of mind and a point of view. Habits of mind are broad, abstract, orienting, habitual ways of thinking, feeling, and acting influenced by assumptions that constitute a set of codes. These codes may be cultural, social, educational, economical, political, or psychological. Habits of mind become articulated in a specific point of view—the constellation of belief, value judgment, attitude, and feeling that shapes a particular interpretation (Mezirow, 1997).

Central to Mezirow's (1991) position is that the transformational process is most often set in motion by a disorienting dilemma. An example of a disorienting dilemma in a patient safety curriculum would be a case study of a medical error. The dilemma would be followed by self-examination by the learner, which would include a critical assessment of the learner's assumptions. Merriam and Caffarella (1999) indicated that such an assessment led to recognition that others had gone through a similar process, which then enabled the learner to formulate a plan of action. Transformational learning also uses a process called *discourse*, which is dialogue devoted to assessing reasons presented in support of competing interpretations by critically examining evidence, arguments, and alternative points of view (Mezirow, 1997). This can be illustrated in a patient safety curriculum through discourse on the occurrence and future prevention of medical errors.

A contextual/sociocultural approach would be useful in patient safety instruction. It views individuals as inextricable from the society in which they live; their develop is determined in part by the society in which they live; they develop in ways intrinsic to themselves but shaped by the discriminatory forces of the society within which they function (Baumgartner, 2001). Instructors utilizing this framework may use Vygotsky's (1978) idea of guided learning. The instructor and learner are active participants in the learning process. This process includes the use of scaffolding, which requires the instructor to adjust the instructional level based on the learner's response. The learner is an apprentice who develops culturally relevant skills through thought and action—an excellent methodology for the instructor and the nursing student.

In summary, adult learning frameworks are conducive to the effective delivery of a patient safety curriculum for nursing students. The concept of andragogy (the art and science of helping adults learn) was proposed by Malcolm Knowles (1980, p. 43) and included "adultness" and "mutuality between teachers and students" (1980, p. 47). These components are needed in the instructional methodology of nursing students. Transformational learning theory was first articulated by Jack Mezirow (1997) and is about change—dramatic, fundamental change in the way we see ourselves and the world in which we live. Central to Mezirow's (1997) position was that the transformational process was most often set in motion by a disorienting dilemma and the use of discourse, which can be incorporated into a patient safety curriculum.

A contextual/sociocultural approach would be useful in patient safety instruction. Instructors utilizing this framework may use Vygotsky's (1978) idea of guided learning. The instructor and learner are active participants in the learning process. This process

includes the use of scaffolding, which requires the instructor adjust the instructional level based on the learner's response. Scaffolding is applicable in the nursing curriculum for both novice and advanced nursing students.

Summary

There is an extensive amount of patient safety literature documenting the importance of the topic since its emergence in the mid-1990s, however, there has been little empirical research documenting an evidence-based patient safety education program in academic nursing curriculum and little research documenting that such a program has improved health outcomes. Nurses are often the first to detect early signs of possible patient complications and play a critical role in health outcomes. There is clearly an opportunity to respond to the urgent call to transform healthcare delivery and better prepare nursing students for that calling. The present study assessed perceptions of nursing students' awareness, skills, and attitudes regarding patient safety. It examined the curriculum, tools, and instructional techniques in place to develop sufficient nursing competency to address the prevention of medical errors and patient safety.

Chapter 3

METHODOLOGY

The purpose of this exploratory study was to examine current patient safety education for nursing students and investigate nursing student awareness, skills, and attitudes about patient safety. The overall goal was to provide recommendations for the needed knowledge base for nursing competence in order for nurses to function as safe practitioners in the healthcare workforce. There were three phases to this study. In Phase I, a pilot study was conducted to establish validity and reliability data for the HPPSACS to determine appropriateness of its use with registered nurses and pre-licensure nursing students. Phase II consisted of the administration of the HPPSACS to a sample of nursing students for purposes of investigating nursing student awareness, skills, and attitudes about patient safety. Phase III involved a content analysis of the patient safety curriculum components at participating schools of nursing. This chapter includes the research questions, the design of the study, the research sample, the research instrument, data collection and analysis procedures, confidentiality, and delimitations and limitations.

Research Questions

1. Will interpretable item constructs be identified when responses to the HPPSACS are intercorrelated and factor analyzed using R-technique exploratory factor analysis?
2. Will responses to items on the HPPSACS yield scores that are internally consistent as indicated by alpha reliability coefficients?

3. What are the perceptions of nursing students about their awareness, skills, and attitudes regarding patient safety?
4. (a) To what extent is there a relationship between the demographic variables of age and gender and nursing students' perceptions of their patient safety awareness, skills, and attitudes?

   (b) To what extant is there a relationship between the demographic variable of race/ethnicity and nursing students' perceptions of their patient safety awareness, skills, and attitudes?
5. To what extent is there a relationship between the type of collegiate nursing program and nursing students' perceptions of their patient safety awareness, skills, and attitudes?
6. To what extent are there discernable program curriculum and instructional methodologies that have been traditionally associated with more positive nursing student perceptions of awareness, skills, and attitudes regarding patient safety?

Research Design

This exploratory quantitative study used a survey research design to examine current patient safety education for nursing students and provide recommendations for improving patient safety education in the academic nursing curriculum with the goal of enhancing health outcomes for patients. This study consisted of three phases. In Phase I the HPPSACS was administered to a group of 400 scholarly professional nurses to obtain supportive validity and reliability data on the patient safety assessment survey. Phases II and III of this study were the substantive phases of the study. Phase II of the study entailed survey research conducted with nursing students at seven universities and

community colleges. The independent or predictor variables were age, gender, race/ethnicity, program of study, and schools. The dependent or criterion variables were the perceptions of patient safety awareness, skills, and attitudes as measured by scores on the four subscales of the HPPSACS. Phase III of this study was qualitative in nature and consisted of a content analysis of the patient safety curricula from the participating institutions and completion of a final analysis and data interpretation. The analysis focused on the placement, nature, and extent of patient safety content within the curriculum. Each program's learning activities, expected learning outcomes, and instructional design were examined for the IOM's competencies in: (a) patient-centered care, (b) teamwork and collaboration, (c) evidence-based practice, (d) quality improvement, (e) safety, and (f) informatics (Greiner & Knebel, 2003).

Research Sample

Phase I of this study consisted of a study population of 400 members of a scholarly professional nurses' organization in the southeastern United States. Phase II and Phase III of this study consisted of a study population of 618 associate degree and baccalaureate nursing students enrolled in the spring term 2007 at seven state universities and colleges in the southeastern United States via a snowball sampling process. This study population was comprised of nursing students in the last term of their associate or baccalaureate (accelerated, traditional or RN-to-BSN) program. Accelerated, in this case, refers to students who had already attained a bachelor's degree prior to entering the baccalaureate program in nursing.

Research Instrument

The 34-item instrument used in this study (HPPSAS) is an adapted version of the Patient Safety/Medical Fallibility Assessment Pre and Post Curriculum Survey created by the University of Missouri-Columbia School of Medicine (Madigosky et al., 2006) for use with medical students. Approval to use the instrument with adaptation was obtained from Wendy S. Madigosky, the principal investigator of the study from which the instrument originated (see Appendix A for a copy of the instrument as used in the present study and Appendix B for copies of correspondence from the instrument's creator acknowledging permission to use the instrument). The survey design was reflective of curricular goals and objectives. Multiple-choice questions assessed knowledge of patient safety. A Likert-type scale assessed attitudes and comfort with skills contributing to patient safety. The dean of the College of Health and the director of the School of Nursing at one of the participating institutions served as reviewers for instrument face validity.

Procedures

The three phases of the present study required differing methods and procedures. Phase I was a pilot test for reliability and construct validity analysis for the HPPSACS using exploratory factor analysis and alpha reliability analysis. Sample size was based on Tabachnik and Fidell's (2001) recommendation that at least five respondents per item are needed for a factor analysis. Therefore, a minimum sample size of 115 participants was planned. After approval from the Institutional Review Board at the University of North Florida, the HPPSACS, cover letter, and postage-paid return envelope were mailed to 400 scholarly professional nurses. These participants were randomly drawn from a

complimentary mailing list obtained from an officer of a scholarly professional nursing organization. Of the 400 surveys that were mailed, 150 were returned completed, for a response rate of 38%. Twenty-one were returned as undeliverable via mail to the participant, which accounted for 5% of the total surveys mailed. Return of the survey indicated consent to participate in the study.

Phase II and Phase III were the substantive components of the study. Upon further review of the HPPSACS it was determined that Items 24 through 28 were limited in scope and were deleted from the survey for Phase II. Demographic items were also added to the survey for Phase II. Sample size was based on Tabachnik and Fidell's (2001) recommendation that at least five respondents per item are needed for a factor analysis. Therefore, a minimum sample size of 115 participants was planned. After receiving approval from the Institutional Review Board at the University of North Florida, a snowball sampling process was used to secure participation commitments from seven university and college schools of nursing. Also, the participating schools provided access to their current patient safety curriculum. Detailed institutional liaison guidelines (Appendix G), the HPPSACS (Appendix F), student cover letters/informed consents (Appendix H), and a pre-paid return mailer for the completed surveys were sent to the designated liaison of each of the seven participating schools of nursing. The liaison administered the HPPSACS to the nursing students at each school. Confidentiality and protection of human subjects were maintained. No student names were requested. Return of the survey indicated consent to participate in the study. There was no penalty to the students for choosing not to participate. The students who agreed to participate in the study were requested to complete the HPPSACS, which took approximately 15 minutes,

while in class. The liaison returned the students' completed surveys as well as the current patient safety curriculum from that institution in the pre-paid mailer. Of the 618 surveys that were mailed to the seven university and college schools of nursing, 318 were returned completed, for a response rate of 51%.

Phase III consisted of a qualitative content analysis that was completed so that the seven participating schools' patient safety curriculum and instructional methodologies, for example, experiential learning, discourse, and critical reflection/thinking that would promote meaningful learning, were compared to the IOM (2003) six core competencies for healthcare professionals. The six core competencies are: (a) patient-centered care, (b) teamwork and collaboration, (c) evidence-based practice, (d) quality improvement, (e) safety, and (f) informatics. A scoring rubric was constructed for a patient safety curriculum quantitative comparison among the seven participating schools of nursing.

Data Analysis Procedures

Phase I of the present study utilized exploratory factor analysis and alpha reliability analysis to test HPPSACS scores for validity and reliability. The items on the patient safety instrument were grouped together to form subscale scores by determining the underlying constructs. This allowed more flexibility in data analysis. Descriptive statistics were also utilized.

Phase II of this study utilized exploratory factor analysis and alpha reliability analysis to explore validity and reliability of scores on the HPPSACS and to test research questions 1 and 2. The items on the patient safety instrument were then grouped together to form subscale scores by determining the underlying constructs. This allowed more

flexibility in data analysis. Descriptive statistics, canonical correlation analysis, and discriminant function analysis were also utilized to test substantive research Questions 3, 4, and 5.

Phase III of this study consisted of a qualitative content analysis of the patient safety curriculum and instructional methodologies among the participating schools of nursing. A scoring rubric was constructed for a patient safety curriculum quantitative comparison and analysis among the seven participating schools of nursing. These data were utilized to test research question 6.

Confidentiality and Institutional Review Board Approval

The study protocol was reviewed and approved by the University of North Florida Institutional Review Board (Phase I – Appendix D; Phase II and Phase III – Appendix I). Confidentiality and protection of human subjects were maintained. No student names were requested. Students were clearly and explicitly informed that their participation was voluntary. There was no penalty to the students for choosing not to participate in this study.

Delimitations and Limitations

This study was delimited to senior nursing students from a purposive sample of collegiate professional nurse preparation programs located in the southeastern United States. The research sample consisted of students completing their last semester of study prior to graduation. Conclusions drawn from this sample may not be generalized to other schools of nursing or other nursing student populations. The survey instrument, institutional curriculum content analysis, and survey findings of this study add to the body of knowledge on patient safety education and may be useful to nursing leaders,

faculty, and educators who are committed to improving patient safety and health outcomes.

This design carries the possibility of several limitations. First, the HPPSACS was adapted from an instrument (Patient Safety/Medical Fallibility Assessment Pre and Post Curriculum Survey) developed for use with medical residents. To address this limitation, the adapted instrument was pilot tested with a group of registered nurses who volunteered to participate for purposes of establishing reliability and validity of the data. Second, the survey is a self-report instrument subject to the weaknesses of all such instruments in that participants' answers were subjective and could have been influenced by social desirability (i.e., the desire to appear personally competent or to assure that their programs were viewed in a positive light). There was also a low rate of return from some of the participating institutions. Third, the HPPSACS was administered at only a few universities and colleges. The awareness, skills, and attitudes about patient safety among the schools' nursing faculty are unknown. In consideration of these delimitations and limitations, care must be exercised in applying these findings.

Summary

Research has indicated that medical errors are occurring in the healthcare system at an alarming rate. Professional and regulatory agencies have clearly indicated the need for competency-based patient safety education in the healthcare curriculum in order to prepare practitioners to address patient safety. The importance of this study is that it examined current patient safety education for nursing students and provides recommendations for improving patient safety education in the academic nursing curriculum to enhance health outcomes for patients.

Chapter 4

FINDINGS

The primary purpose of this exploratory study was to gain a better understanding of the current status of patient safety awareness among registered nurses and pre-licensure nursing students. To this end, six research questions guided the study:

1. Will interpretable item constructs be identified when responses to the HPPSACS are intercorrelated and factor analyzed using R-technique exploratory factor analysis?
2. Will responses to items on the HPPSACS yield scores that are internally consistent as indicated by alpha reliability coefficient?
3. What are the perceptions of nursing students about their awareness, skills, and attitudes regarding patient safety?
4. (a) To what extent is there a relationship between the demographic variables of age and gender and nursing students' perceptions of their patient safety awareness, skills, and attitudes?

   (b) To what extent is there a relationship between the demographic variable of race/ethnicity and nursing students' perceptions of their patient safety awareness, skills, and attitudes?
5. To what extent is there a relationship between the type of collegiate nursing program and nursing students' perceptions of their patient safety awareness, skills, and attitudes?
6. To what extent are there discernable program curriculum and instructional

methodologies that have been traditionally associated with more positive student perceptions of awareness, skills, and attitudes regarding patient safety?

The study utilized quantitative methodology with a descriptive research design in Phases I and II, and content analysis in Phase III. The study was conducted in three phases: (a) Phase I was the pilot test for reliability and construct validity analysis for the HPPSACS using exploratory factor analysis and data obtained from 150 professional nurses; (b) Phase II was a substantive component of the study and consisted of data collection and analysis from seven schools of nursing; and (c) Phase III was a second substantive component of the study and consisted of a content analysis of each school's patient safety curriculum. Both Phase I and Phase II of the study featured the administration of an adapted version (HPPSACS) of the Patient Safety/Medical Fallibility Assessment Pre and Post Curriculum Survey created by the University of Missouri-Columbia School of Medicine (Madiogosky et al., 2006) for use with medical students. Approval to use the instrument with adaptation was obtained from Wendy S. Madigosky the principal investigator of the study from which the instrument originated (see Appendix A for a copy of the instrument as used in the present study and Appendix B for copies of correspondence from the instrument's creator acknowledging permission to use the instrument). The dean of the College of Health and the director of the School of Nursing at one of the participating institutions served as the reviewers for instrument face validity.

In chapter 4, the data are presented in the order they were obtained: Phase I, the pilot study; Phases II and III, the substantive components of the study. Found within Phase I of this chapter is a detailed discussion regarding the findings of the pilot study

and the data analyses relative to that component of the study. Subsequent analyses focused on the findings related to Phases II and III of the study. All statistical analyses were performed using the Statistical Package for the Social Sciences (2004) version 13.0. After the data analyses are presented within each phase of the study, the research questions are addressed separately.

Phase I

Overview

Phase I of this study was the administration of a 34-item instrument, HPPSACS, to a group of 400 professional nurses to obtain supportive validity and reliability data on the survey after approval was obtained from the Institutional Review Board at the University of North Florida. Confidentiality and protection of human subjects were maintained. The survey design was reflective of curricular goals and objectives. The instrument assessed the participants' knowledge, skills, and attitudes about patient safety. Respondents were asked to indicate their levels of agreement/disagreement on a Likert-type scale as follows for Items 1 through 23: 5 (*strongly agree*), 4 (*agree*), 3 (*neutral*), 2 (*disagree*), and 1 (*strongly disagree*). Items 24 through 28 of the survey consisted of multiple-choice questions that assessed knowledge of patient safety. Items 29 through 34 of the survey consisted of questions to which the respondents were to reply either *yes* or *no* regarding patient safety situations that they might have previously experienced.

This pilot phase included a validity analysis of the sample data on the HPPSACS. Sample size was based on Tabachnik and Fidell's (2001) recommendation that at least five respondents per item are needed for a factor analysis. Of the 400 surveys that were

mailed, 150 were completed, for a response rate of 38%, which exceeded Tabachnik and Fidell's threshold of 115 needed to assure stable factor analytic results.

Exploratory Factor Analysis

Data from Phase I were factor analyzed to determine underlying factor constructs for the purpose of synthesizing key themes that accounted for the variation in response across 23 survey items. Factors were extracted using the principal components analysis method, and results were rotated to the orthogonal varimax with Kaiser normalization criterion. The initial factor analysis yielded eight factors with default eigenvalues greater than 1. Inspection of the results of the varimax rotated solution indicated that variance among the eight factors was spread out so evenly that very few items were associated with any of the factors and, therefore, were not interpretable. Consequently, several additional solutions extracting fewer factors were attempted. A visual inspection of the factor scree plot indicated a break between Factors IV and V. Based on this observation, a factor solution specifying four factors was consulted.

Generally speaking, factor solutions are considered viable if all items are "univocal" (i.e., "speak through" only one factor). Although the four-factor solution resulted in items that were univocal, the last two factors were defined by relatively few items and were difficult to interpret. Consequently, a three-factor solution was examined. The factor matrix produced by this process provided a meaningful and concise list of constructs representative of the perceptions of patient safety by the scholarly professional nurses' group being studied in the Phase I pilot study. Three factors with themes that were found to relate to perceptions of patient safety among the scholarly professional nurses' group were identified. These themes were: (a) comfort (Factor I); (b) error

reporting (Factor II); and (c) denial (Factor III). The rotated factor structure matrix for this solution is presented in Table 1. Factor saliency was determined based on a structure coefficient of |.50|. Saliency criteria lower than |.50| were utilized initially; however, these criteria were deemed less than adequate as factors were less interpretable and several items were correlated with two or more factors.

Table 1

Varimax and Sorted Rotated Factor Structure Matrix for the HPPSACS (Phase I; n = 150)*

HPPSACS item numbers:	1	2	3
Comfort			
23. Disclosing an error.	**.86**	.04	-.07
22. Disclosing an error to a faculty.	**.84**	.07	-.08
21. Advising a peer.	**.75**	.11	-.16
19. Completing an incident report.	**.71**	.05	-.31
20. Analyzing a case.	**.70**	-.16	-.11
Error Reporting			
9. Communication on safety.	-.01	**.65**	.02
10. Routine report medical errors.	-.00	**.65**	-.01
8. Healthcare professionals share.	-.14	**.54**	-.11
6. Deal constructively with errors.	-.15	**.55**	.08
11. Reporting systems do little.	-.11	-.49	.22
17. Work harder.	.08	.47	.33
3. Working to improve patient.	.22	.33	-.04
5. Should not tolerate uncertainty.	.28	.32	.07
18. Gap between "best care."	-.24	-.31	.01
2. Professionals do not make.	.16	.29	-.03
1. Making errors is inevitable.	-.15	-.16	-.14
12. Physicians should report errors.	.04	.13	-.10
Denial			
15. If I saw a medical error.	-.21	-.15	**.73**
14. There is no need to address.	-.21	-.14	**.71**
4. Only physicians can determine.	.11	.18	**.55**
13. Effective responses.	-.04	.27	.49
7. Learning how to improve.	.12	.07	-.48
16. Can't do anything about.	-.13	-.18	.43

*Coefficients greater than |.50| are in bold type, by construct.

Factor I was identified by five items, and it had a prerotational eigenvalue of 3.9. Item content suggested that the salient items dealt with the level of comfort the respondent felt with the completion of incident reports and disclosure of medical errors; therefore, the factor was labeled as comfort. Factor II was identified by four items, and it had a prerotational eigenvalue of 2.56. Item content suggested that the salient items dealt with the reporting and dealing with medical errors; therefore, the factor was labeled as error reporting. Factor III was identified by three items, and it had a prerotational eigenvalue of 1.82. Item content suggested that the salient items dealt with the denial of medical errors; therefore, the factor was labeled as denial. Eleven items did not correlate with any of the three factors, suggesting that these items were not reflective of the identified constructs.

Alpha Reliability Analysis

As a measure of the internal consistency reliability of scores on the HPPSACS in Phase I, the data were subjected to alpha reliability analysis. Separate estimates were computed for scores on the full set of Likert-type items (23 items) and for the three expected subscales (5 items, 4 items, and 3 items), respectively, based on the foregoing factor analytic results. The Cronbach alpha reliability coefficient for scores on the entire scale was .59. This value was below the threshold of .70 recommended by Nunnally (1978); however, it is common that reliability estimates are somewhat lower for new instruments (Pedhazur & Schmelkin, 1991), and in these cases "it is for the user to determine what amount of error he or she is willing to tolerate" (p. 110). As data from this instrument have not heretofore been subjected to reliability analysis, this result was deemed adequate. Alpha estimates for the expected subscales were above or near the

range of the recommended level of .70. Specifically, coefficients alpha for scores on the comfort, error reporting, and denial subscales were .86, .62, and .63, respectively. Whereas the coefficient alpha for two of the three subscales were below Nunnally's criterion, these coefficients were reasonable considering the small number of items on each subscale and the exploratory nature of this construct validity analysis.

Conclusion

Results indicated that three identifiable factor constructs were represented by the HPPSACS with data from the initial sample. Scores for the entire instrument and for the three subscales were adequately reliable for an instrument in developmental stages. The appreciable alpha coefficient for the comfort subscale (.86) was especially promising.

Phase II

Overview

Phase II was the first substantive component of the study. Upon further review of the HPPSACS, it was determined that Items 24 through 28 were limited in scope and they were deleted from that survey. Demographic items were also added to the survey for Phase II. Sample size was based on Tabachnik and Fidell's (2001) recommendation that at least five respondents per item are needed for a factor analysis. Therefore, a minimum sample size of 115 participants was planned. After approval from the Institutional Review Board at the University of North Florida, a snowball sampling process was used to secure participation commitments from seven university and college schools of nursing. Also, the participating schools provided access to their current patient safety curriculum. Confidentiality and protection of human subjects were maintained. No student names were requested. Return of the survey indicated consent to participate in the

study. There was no penalty to the students for choosing not to participate. The students who agreed to participate in the study were asked to complete the HPPSACS, which took approximately 15 minutes, while in class. Of the 618 surveys that were mailed to the seven universities and colleges of nursing, 318 were returned completed for a response rate of 51%. These data were used to address research questions 1 through 5.

Demographic Characteristics of the Sample

Demographic data were collected from participants to better understand the perceptions of patient safety among the nursing students at the seven university and college schools of nursing. There were five items related to demographic characteristics of the sample. The frequencies for the demographic variables are presented in Table 2.

School G comprised the most nursing students from the seven universities and colleges that participated in the study with 27.7% (n = 88); 20.8% (n = 66) of the participants came from School B; 14.5% (n = 46) from School D; 12.3% (n = 39) from School F; 9.4% (n = 30) from School A; 7.9% (n = 25) from School C; and 7.5% (n = 24) from School E.

Participants indicated which one of the four program types (i.e., associate, RN-to-BSN, accelerated, and traditional) most resembled their program of study. Due to a low response rate (n = 5) for the RN-to-BSN category, it was deemed appropriate to collapse those responses into the traditional nursing program of study. Study response results from the remaining three nursing programs indicated that 44.7% (n = 142) of the participants were from associate degree programs of study; 40.6% (n = 129) were from traditional programs of study; and 14.8% (n = 47) were from accelerated programs of study.

Table 2

Sample Demographic Data

Demographic Variable	Category	*n*	%
School	A	30	9.4
	B	66	20.8
	C	25	7.9
	D	46	14.5
	E	24	7.5
	F	39	12.3
	G	88	27.7
Program	Associate	142	44.7
	RN-to-BSN*		
	Accelerated	47	14.8
	Traditional	129	40.6
Gender	Female	229	72.0
	Male	29	9.1
Ethnicity	African American	29	9.1
	Asian American	12	3.8
	Caucasian	151	47.5
	Hispanic	44	13.8
	Native American*	1	.3
	Other	16	6.3
Age	Range = 41 (min. of 19 to max. of 60)		
	Mean = 29, Standard Deviation = 8.97		

Due to low response rate ($n = 5$) for the RN-to-BSN program of study, those responses were collapsed into the traditional program of study. Due to a low response rate ($n = 1$) from the Native American ethnicity group, that response was collapsed into the *other* ethnicity category for data analysis purposes.

Of the 318 nursing students completing the surveys, 72% ($n = 229$) were female; 9.1% ($n = 29$) were male; and 18.9% ($n = 60$) did not respond to that particular question. Ages of nursing students ranged from 19 to 60 years, with the mean age of 29 ($SD = 8.97$); 25.8% ($n = 82$) did not respond to that particular question. Caucasian

nursing students constituted the largest ethnicity represented in the sample with 47.5% (n = 151); 13.8% (n = 44) were Hispanic; 9.1% (n = 29) were African American; 5% (n = 16) reported as other; 3.8% (n = 12) were Asian American; 0.3% (n = 1) were Native American ; and 20.4% (n = 65) did not respond to that particular question. Due to the low response rate (n = 1) for Native Americans, it was deemed appropriate to collapse that response into the *other* ethnicity category for data analysis purposes.

Exploratory Factor Analysis

Data from Phase II were factor analyzed to determine underlying factor constructs for the purpose of synthesizing key themes that accounted for the variation in response across 23 survey items. Factors were extracted using the principal components analysis method, and results were rotated to the orthogonal varimax with Kaiser normalization criterion. The initial factor analysis yielded eight factors with default eigenvalues greater than 1. Inspection of the results of the varimax rotated solution indicated that variance among the eight factors was spread out so evenly that very few items were associated with any of the factors and, therefore, the results were not interpretable. Consequently, several additional solutions extracting fewer factors were attempted. A computation of a five factor analysis yielded four doublets/triplets. A visual inspection of the factor scree plot indicated a break between Factors IV and V. Based on this observation, a factor solution specifying four factors was computed. The factor matrix produced by this process provided a meaningful and concise list of constructs representative of the nursing students' perceptions of patient safety in Phase II of the study. Four factors with themes that were found to relate to perceptions of patient safety among the nursing students were identified. These themes were: (a) comfort (Factor I); (b) error reporting (Factor II); (c)

denial (Factor III); and (d) culture (Factor IV). The rotated factor structure matrix for this solution is presented in Table 3. Factor saliency was determined based on a structure coefficient of |.50|. Saliency criteria lower than |.50| but greater than |.30| were considered initially; however, these criteria were deemed less than adequate as factors were less interpretable and several items were correlated with two or more factors.

Table 3

*Varimax and Sorted Rotated Factor Structure Matrix for the HPPSACS (Phase II; n = 318)**

HPPSACS item numbers:	1	2	3	4
Comfort				
21. Advising a peer.	**.77**	.11	.01	-.03
19. Completing an incident report.	**.76**	.099	.10	-.08
20. Analyzing a case.	**.75**	.08	.05	.05
23. Disclosing an error.	**.75**	.11	-.10	.08
22. Disclosing error to faculty.	**.69**	.10	-.03	.15
Error Reporting				
6. Deal constructively with errors.	.17	**.68**	-.01	.10
8. Healthcare professionals share.	.25	**.66**	-.08	.14
10. Routine report medical errors.	.19	**.62**	-.03	.11
4. Only physicians can determine.	-.12	.39	.37	-.37
2. Professionals do not make.	.15	.39	.17	.07
13. Effective responses.	-.12	.35	.07	-.16
17. Work harder.	-.06	.35	-.03	.26
5. Should not tolerate uncertainty.	.09	.33	-.10	.23
Denial				
16. Can't do anything about.	.02	.11	**.71**	-.11
14. There is no need to address.	-.02	.23	**.69**	-.13
15. If I saw a medical error.	.00	-.14	**.67**	.02
11. Reporting systems do little.	-.01	-.16	**.57**	-.07
Culture				
7. Learning how to improve.	.12	.22	-.15	**.72**
3. Working to improve patient.	.03	.13	-.18	**.67**
9. Communication on safety.	.16	.16	-.09	**.51**
1. Making errors is inevitable.	-.04	-.12	.32	**.40**
18. Gap between "best care."	-.17	-.34	.24	.34

*Coefficients greater than |.40| are in bold type, by construct.

Factor I was identified by five items, and it had a prerotational eigenvalue of 3.72. Item content suggested that the salient items dealt with the level of comfort the respondent felt with the completion of incident reports and disclosure of medical errors; therefore, the factor was labeled comfort. Factor II was identified by three items, and it had a prerotational eigenvalue of 2.52. Item content suggested that the salient items dealt with the reporting and dealing with medical errors; therefore, the factor was labeled error reporting. Factor III was identified by four items, and it had a prerotational eigenvalue of 1.85. Item content suggested that the salient items dealt with the denial of medical errors; therefore, the factor was labeled denial. Factor IV was identified by three items, and it had a prerotational eigenvalue of 1.47. Item content suggested that the salient items dealt with the culture of patient safety (an awareness and application of patient safety principles in the organization); therefore, the factor was labeled culture. Eight items did not correlate with any of the four factors, suggesting that these items are not reflective of, or only weakly related to, the identified constructs.

Alpha Reliability Analysis

As a final measure of the measurement integrity of the HPPSACS in Phase II, the data were subjected to alpha reliability analysis. Separate reliability estimates were computed for scores on the full set of Likert-type items ($n = 23$), and for the four expected subscales (consisting of five items, three items, four items, and three items), respectively, based on the foregoing factor analytic results. The Cronbach alpha reliability coefficient for scores on the entire scale was .71. This value exceeds the threshold of .70 recommended by Nunnally (1978). Alpha estimates for the expected subscales were above or near the range of the recommended level of .70. Specifically,

coefficients alpha for scores on the comfort, error reporting, denial, and culture subscales were .82, .70, .65, and .64, respectively. Although some of the values were below the threshold of .70 recommended by Nunnally, it is common that reliability estimates are somewhat lower for new instruments (Pedhazur & Schmelkin, 1991), and in these cases "it is for the user to determine what amount of error he or she is willing to tolerate" (p. 110).

Conclusion. Results from the demographic data indicated that the majority of the nursing students were from associate nursing degree programs of study; most were female; most were Caucasian; and the mean age of the respondents was 29.

Factor analytic results indicated that four identifiable factor constructs were represented by the HPPSACS with data from Phase II of the study. Scores for the entire instrument and for the four subscales were adequately reliable for an instrument in developmental stages. The appreciable alpha coefficient for the comfort subscale (.82) was especially promising.

Research Questions 1 and 2. The first research question under study was, "Will interpretable constructs be identified when responses to the HPPSACS are intercorrelated and factor analyzed using R-technique exploratory factor analysis?" The results from the exploratory factor analysis provide evidence in support of this research question. Four identifiable factor constructs were culled from the study data with themes of comfort, error reporting, denial, and culture. Scores for the entire instrument and for the four subscales were adequately reliable for an instrument in developmental stages. The appreciable alpha coefficient for scores on the comfort subscale (.82) was especially promising.

The second research question under study was, "Will responses to items on the HPPSACS yield scores that are internally consistent as indicated by alpha reliability coefficients?" The alpha reliability coefficients obtained yielded evidence in support of this research question. Alpha estimates for scores on the expected subscales were above or near the range of the recommended level of .70. Specifically, coefficient alphas for scores on the comfort, error reporting, denial, and culture subscales were .82, .70, .65, and .64, respectively, all of which were appropriate for an instrument in its developmental stages (Pedhazur & Schmelkin, 1991).

Descriptive Statistics for the HPPSACS

Respondents were asked to indicate their levels of agreement/disagreement on a Likert-type scale for Items 1 through 23 as 5 (*strongly agree*), 4 (*agree*), 3 (*neutral*), 2 (*disagree*), and 1 (*strongly disagree*). Items 24 through 29 of the survey consisted of questions to which the respondents were to reply either *yes* or *no* regarding patient safety situations that they might have previously experienced (see Appendix F for the text of the HPPSACS). On average, the nursing students agreed with Question 3 (Healthcare professionals should routinely spend part of their professional time working to improve patient care; $M = 4.35$, $SD = .80$); Question 7 (Learning how to improve patient safety is an appropriate use of time in health programs in school; $M = 4.35$, $SD = .81$); and, most strongly, with Question 9 (In my clinical experiences so far, faculty and staff communicate to me that patient safety is a high priority; $M = 4.35$, $SD = .86$). On average, the nursing students disagreed most strongly with Question 4 (Only physicians can determine the causes of a medical error; $M = 1.52$, $SD = .78$). The subscale theme results were: (a) comfort ($M = 16.31$, $SD = 4.18$); (b) error reporting ($M = 8.86$, $SD =$

2.46); (c) denial ($M = 7.57$, $SD = 2.30$); and (d) culture ($M = 16.19$, $SD = 2.32$). Descriptive statistics for each of the items on the full-scale survey and the five criterion variable subscales (comfort, error reporting, denial, and culture) are presented in Table 4.

Table 4

Descriptive Statistics for the HPPSACS *23-Item Scale**

	Minimum	Maximum	Mean	Std. Deviation	Weighted Mean
1	1.00	5.00	3.13	1.16	-
2	1.00	5.00	2.50	1.11	-
3	1.00	5.00	4.35	.80	-
4	1.00	5.00	1.52	.78	-
5	1.00	5.00	3.54	1.06	-
6	1.00	5.00	2.87	1.00	-
7	1.00	5.00	4.35	.81	-
8	1.00	5.00	3.06	1.11	-
9	1.00	5.00	4.35	.86	-
10	1.00	5.00	2.94	1.00	-
11	1.00	5.00	2.42	.93	-
12	1.00	5.00	2.78	1.05	-
13	1.00	5.00	2.91	1.04	-
14	1.00	5.00	1.67	.81	-
15	1.00	5.00	1.65	.78	-
16	1.00	5.00	1.82	.76	-
17	1.00	5.00	3.87	.99	-
18	1.00	5.00	3.61	1.03	-
19	1.00	5.00	2.93	1.15	-
20	1.00	5.00	3.23	1.11	-
21	1.00	5.00	3.43	.96	-
22	1.00	5.00	3.40	1.15	-
23	1.00	5.00	3.32	1.12	-
Comfort	5.00	25.00	16.31	4.18	3.26
Err Reporting	3.00	15.00	8.86	2.46	2.95
Denial	4.00	20.00	7.57	2.30	1.89
Culture	4.00	20.00	16.19	2.32	4.05

*Note: Text of the HPPSACS items is presented in Appendix F, $n = 318$. Subscales Are: Comfort, Error Reporting, Denial, and Culture. Weighted mean is the subscale mean score divided by the number of items included in the scale.

Research Question 3

The third research question under study was, "What are the perceptions of nursing students about their awareness, skills, and attitudes regarding patient safety?" The descriptive statistics of the nursing students' responses on the HPPSACS provide evidence in support of this research question as illustrated in Table 4. The statistics provide evidence of variation in responses on the 23-item survey as well as for responses on the four subscales: (a) comfort, (b) error reporting, (c) denial, and (d) culture. Data results from Phase II indicated nursing students' perceptions of their own awareness, skills, and attitudes regarding patient safety. Subscale weighted mean scores (i.e., mean scores divided by number of items on each subscale) can be useful in making direct comparisons of the subscale scores in response to research questions. These values indicated that participants had much higher agreement with items on the culture and comfort subscales and lower agreement on the error reporting and denial subscales.

Canonical Correlation Analysis

To examine to what extent there was a relationship between the demographic variables of age and gender and nursing students' perceptions of their patient safety awareness, skills, and attitudes, a canonical correlation analysis was conducted. Canonical correlation was selected as the data analysis procedure because it allows for the complex interrelationships within and among two sets of variables to be considered simultaneously. The Statistical Package for the Social Sciences (2004) multivariate analysis of variance (MANOVA) procedure was utilized. The MANOVA procedure yields a canonical correlation analysis when no independent variables are specified and the independent variables are instead listed as covariates.

For the purpose of conducting the canonical analysis, the two independent predictor variables included age and gender. The four dependent or criterion variables consisted of scores on the four subscales of the HPPSACS, namely comfort, error reporting, denial, and culture. The ethnicity variable was collapsed from the original six categories into five with the Native American ($n = 1$) category included in the *other* category.

Canonical function 1 ($R_c^2 = .17$) indicated that for the best set of weights for variables across the two sets, the independent variables shared approximately 17% of their variances with the dependent variables, which is a small effect but well above the 10% standard suggested by Pedhazur (1982) to be considered noteworthy. Function 1 was statistically significant ($p < .001$). Function 2 was trivial ($R_c^2 = .00$) and not statistically significant. The eigenvalues and canonical correlations are illustrated in Table 5.

Table 5

Eigenvalues and Canonical Correlations

Function No.	Eigenvalue	Percentage	Cumulative Percentage	Canonical Correlation	Squared Correlation
1	.21	98.05	98.05	.42	.17*
2	.00	1.96	100.00	.07	.00

*$p < .001$

The canonical function and structure coefficients for the predictor variables across the two canonical functions are presented in Table 6. While both sets of coefficients may be useful in determining the contribution of a given variable to the variate composite, the canonical structure coefficients are considered more reliable indicators of variable contribution (Daniel, Adams, & Smith, 1994) and were employed for the interpretation of

these results. Standardized canonical function and structure coefficients for dependent variables are presented in Table 7.

Table 6

Function and Structure Coefficients for Independent/Predictor Variables

Variable	Function 1	Function 2
Independent/Predictor Variable Standardized Canonical Function Coefficients		
Age	.81	-.61
Gender	.48	.89
Independent/Predictor Variable Canonical Structure Coefficients		
Age	**.88**	-.48
Gender	**.60**	.80

*Noteworthy structure coefficients for Function 1 are presented in bold.

Conclusion. In interpreting canonical Function 1, the small but appreciable correlation between the variable sets is due primarily to the relationship between age and gender in the predictor set and comfort and culture in the dependent set. Analysis of the signs (positive versus negative) of the structure coefficients indicates that older male participants had higher comfort subscale scores and lower culture subscale scores than did younger female participants. Younger females were not as comfortable with patient safety issues but were more likely to agree with items relative to the culture of patient safety.

Research Question 4 (a). The fourth question (part a) under study was, "To what extent is there a relationship between the demographic variables of age and gender and nursing students' perceptions of their patient safety awareness, skills, and attitudes?" The effects of age and gender were examined using canonical correlation analysis. The results from the canonical correlation analysis provided evidence in support of this research question in that older male participants had higher comfort subscale scores and lower culture subscale scores than did younger female participants. Younger females were not

as comfortable with patient safety issues but were more likely to agree with items relative to the culture of patient safety.

Table 7

Function and Structure Coefficients for Dependent/Criterion Variables

Variable	Function 1	Function 2
Dependent/Criterion Variable Standardized Canonical Function Coefficients		
Comfort	.83	.44
Error Reporting	.01	-.99
Denial	-.23	-.17
Culture	-.57	.50
Dependent/Criterion Variable Canonical Structure Coefficients		
Comfort	**.80**	.19
Error Reporting	.15	-.73
Denial	-.26	-.17
Culture	**-.49**	.33

*Noteworthy structure coefficients for Function 1 are presented in bold.

Discriminant Function Analysis

The relationship between race/ethnicity and the four HPPSACS subscales was examined using discriminant function analysis. Because ethnicity was collapsed into five categories and there were four predictive subscales the analysis yielded four discriminant functions.

Function 1 accounted for 20% of the variance between groups (Wilks' lambda = .80; $p < .001$). Function 2, also of noteworthy size, accounted for 10% of the variance between groups (Wilks' lambda = .90; $p < .01$). The remaining two functions (Wilks' lambda values of .98 and 1.00, respectively) were negligible in statistical effect and not statistically significant ($p > .05$). Discriminant function and structure coefficients are presented in Table 8. For Function 1, groups were most distinguished by the denial and culture subscales (structure coefficients = . 72 and .52, respectively) whereas for Function

2, comfort and error reporting were the more weighted predictors (structure coefficients = .59 and .77, respectively).

Conclusion. The territorial plot for the discriminant analysis is presented in Figure 1. Function 1 most clearly distinguished Asian American participants from the combined set of African American and Hispanic participants, with Asian Americans having higher denial and culture scores. Function 2 most clearly distinguished participants of *other* ethnic identity from the combined set of Caucasian and Hispanic participants, with those of *other* ethnicity having higher comfort and error reporting scores.

Table 8

Function and Structure Coefficients for Independent/Predictor Variables

Variable	Function 1	Function 2	Function 3	Function 4
Independent/Predictor Variable Discriminant Function Coefficients				
Comfort	-.04	.42	.85	.44
Err Reporting	.39	.76	-.49	-.40
Denial	.79	-.12	-.12	.60
Culture	.51	-.51	.51	-.54
Independent/Predictor Variable Discriminant Structure Coefficients				
Denial	.72*	-.17	-.22	.64
Err Reporting	.43	.77*	-.13	-.44
Comfort	.04	.59	.78*	.22
Culture	.52	-.28	.50	-.64*

*Largest absolute correlation between each variable and any discriminant function.

Research Question 4 (b). The fourth question (part b) under study was, "To what extent is there a relationship between the demographic variable of race/ethnicity and nursing students' perceptions of their patient safety awareness, skills, and attitudes?" The results from the discriminant analysis provide evidence in support of this research question. The Asian Americans were clearly distinguished from the combined set of African American and Hispanic participants on the denial and culture scores. The *other*

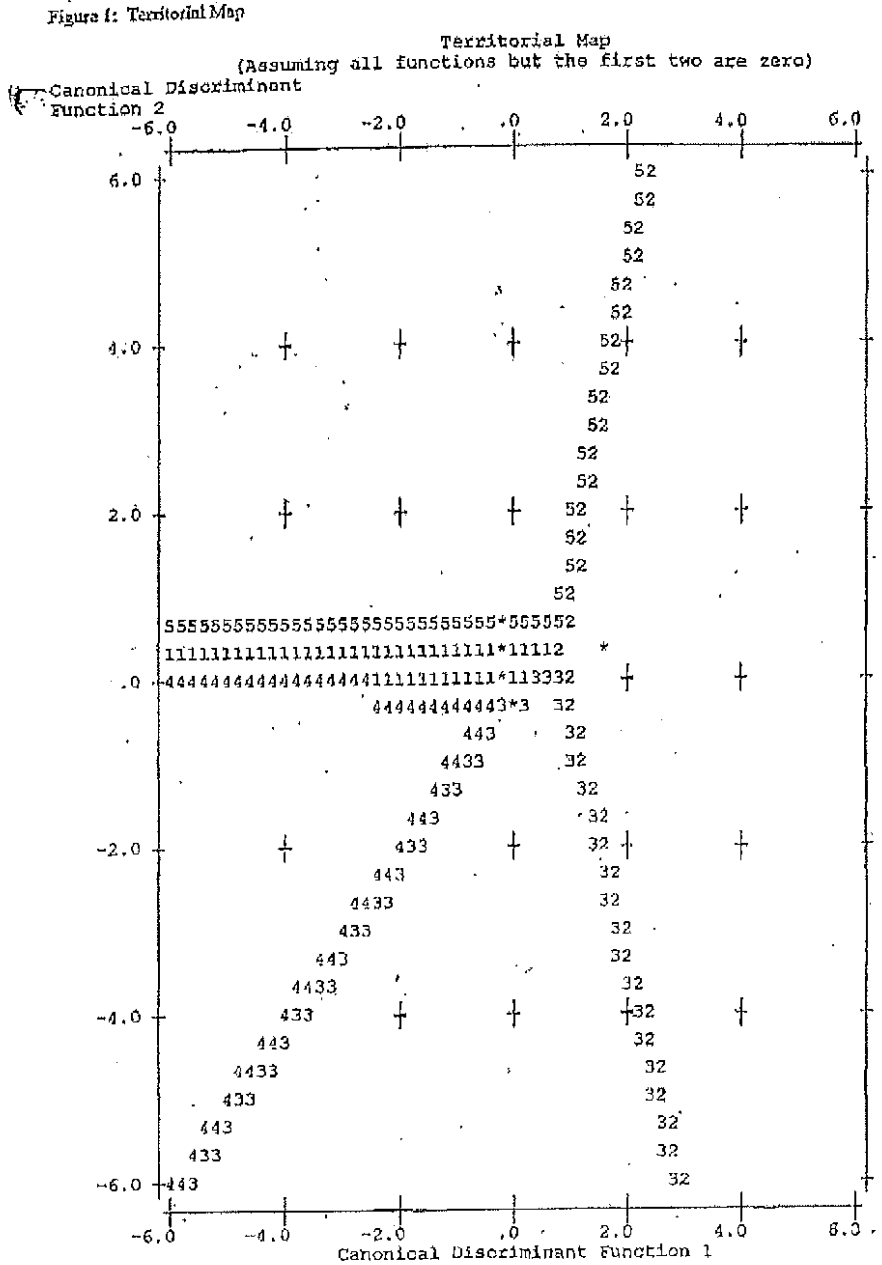
ethnic identity was clearly distinguished from the combined set of Caucasian and Hispanic participants on the comfort and error reporting scores.

Discriminant Function Analysis

To examine to what extent there was a relationship between the type of collegiate nursing program and nursing students' perceptions of their patient safety awareness, skills, and attitudes, a discriminant function analysis was conducted. For this analysis, the program type served as the grouping variable and the four HPPSACS subscales were the predictors. The analysis yielded two discriminant functions. Function 1 accounted for 24% of the variance between groups (Wilks' lambda = .76; $p < .001$). Function 2 was negligible in its effect size, accounting for only 2.6% of the variance between groups (Wilks' lambda = .97; $p < .05$). Discriminant function and structure coefficients are presented in Table 9. For Function 1, groups were most distinguishable by error reporting and comfort (structure coefficients = .82 and .46, respectively) whereas for Function 2, culture and denial (structure coefficients = .57 and .44, respectively) accounted for group differences.

The territorial plot for the discriminant analysis is presented in Figure 2. Function 1 most clearly distinguished the associate nursing degree program from the combined set of the accelerated and traditional nursing degree programs. Discriminant structure coefficients indicated that the associate degree students had higher error reporting and comfort scores. Function 2 was not interpreted due to the small effect size even though it was statistically significant.

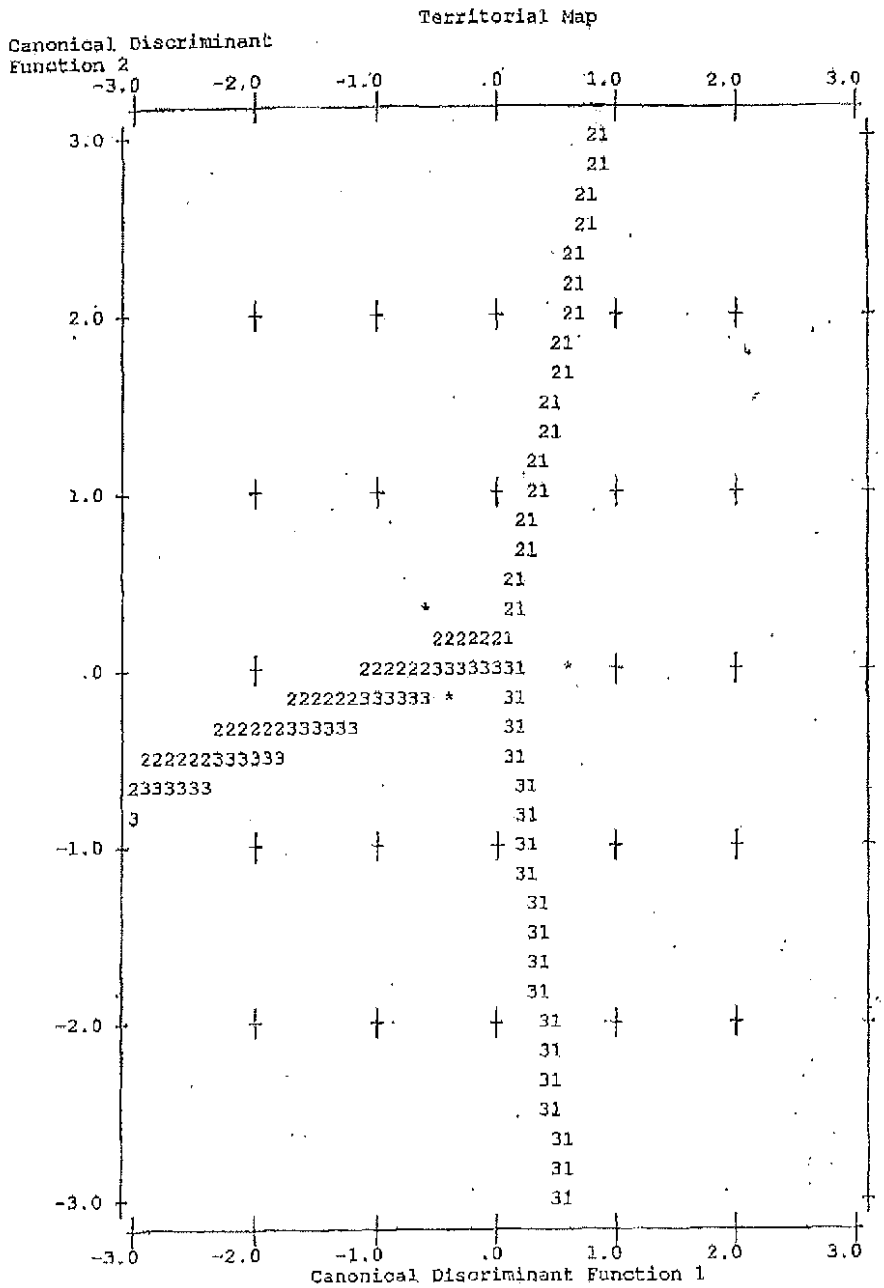
Figura 1: Territorial Map



Symbols used in territorial map

Symbol	Group	Label
1	1	
2	2	
3	3	
4	4	
5	6	
*		Indicates a group centroid

Figure 2: Territorial Map



Symbols used in territorial map

Symbol	Group	Label
1	1	Associate
2	2	Accelerated
3	3	Traditional
*		Indicates a group centroid

Conclusion. The territorial plot for the discriminant analysis is presented in Figure 2. Function 1 most clearly distinguished the associate nursing degree program from the combined set of the accelerated and traditional nursing degree programs with participants in the associate nursing degree program having higher scores in the error reporting and comfort subscales.

Research Question 5. The fifth research question under study was, "To what extent is there a relationship between the type of collegiate nursing program and nursing students' perceptions of their patient safety awareness, skills, and attitudes?" The results from the discriminant analysis provide evidence in support of this research question. The associate nursing degree programs were clearly distinguished from the combined set of the accelerated and traditional nursing degree programs.

Ancillary Analysis

An ancillary analysis was conducted to examine the relationship between the nursing students' perceptions of their patient safety awareness, skills, and attitudes and the seven participating schools of nursing in this study using discriminant function analysis. Function 1 accounted for 33% of the variance between groups (Wilks' lambda = .67; $p < .001$). The remaining three functions (Wilks' lambda values of .94, .96, and .99, respectively) were negligible in statistical effect and not statistically significant ($p > .05$). Discriminant function and structure coefficients are presented in Table 9. For Function 1, groups were most distinguished by the error reporting and comfort (structure coefficients = .83 and .39, respectively).

The territorial plot for the discriminant analysis is presented in Figure 3. Interestingly, Function 1 most clearly distinguished the schools having associate nursing

degree programs (Schools A, E, and G) from the combined set of schools with accelerated and traditional nursing degree programs (Schools B, C, and F). The schools with associate nursing degree programs had higher error reporting and comfort scores.

Table 9

Function and Structure Coefficients for Independent/Predictor Variables

Variable	Function 1	Function 2	Function 3	Function 4
Independent/Predictor Variable Discriminant Function Coefficients				
Comfort	.14	-.43	.93	-.13
Err Reporting	1.00	.16	-.35	.28
Denial	.19	.79	.27	-.53
Culture	-.54	.56	.37	.65
Independent/Predictor Variable Discriminant Structure Coefficients				
Err Reporting	.83*	.16	.02	.53
Denial	.14	.72*	.23	-.64
Comfort	.39*	-.33	.88*	.07
Culture	-.17	.46	.35	.80*

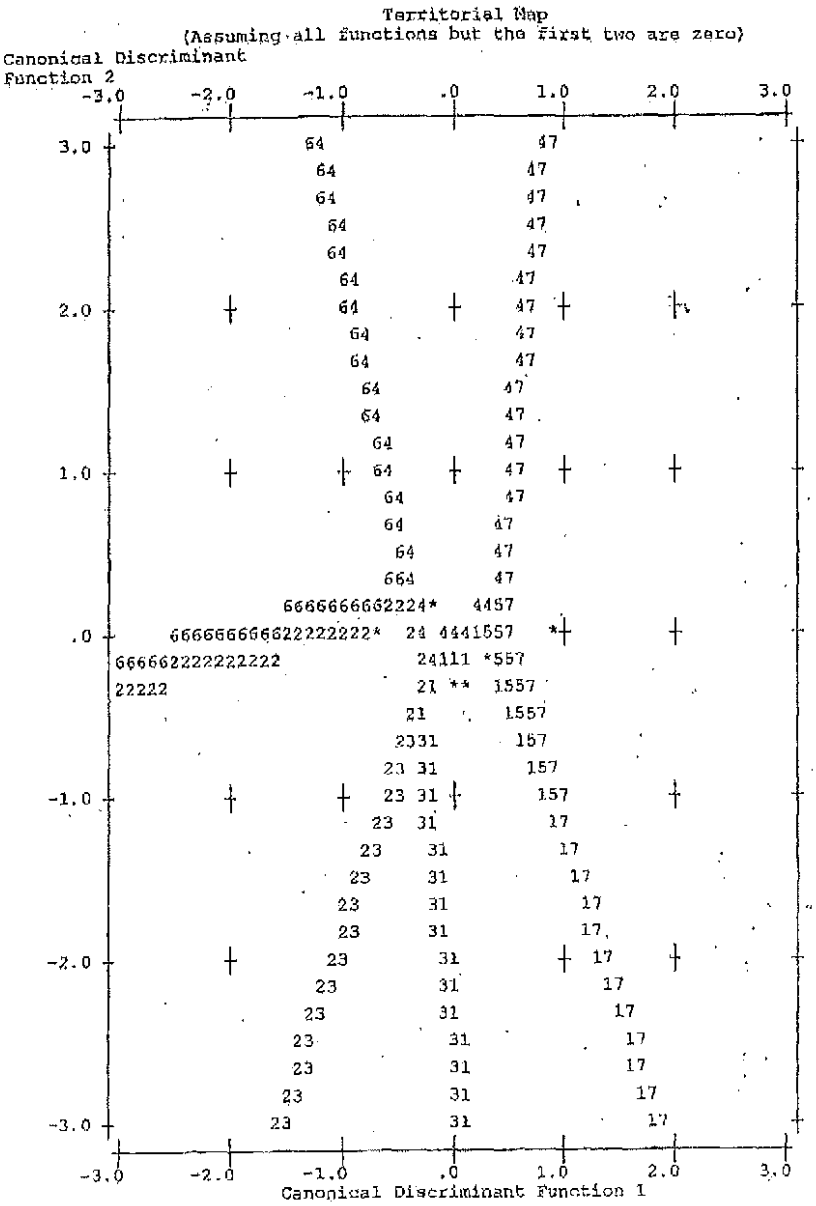
*Largest absolute correlation between each variable and any discriminant function.

Phase III

Overview

Phase III was the second substantive phase of the study. This phase consisted of a content analysis of the patient safety curriculum and instructional methodologies among the participating schools of nursing. A content analysis is a qualitative research tool in which specific characteristics of a body of material (e.g., a patient safety curriculum) can be identified, coded, and tabulated for the frequency of each characteristic (Leedy & Ormrod, 2001, p. 157). A comprehensive content analysis that includes the documents reviewed from each participating school of nursing can be found in Appendix J.

Figure 3: Territorial Map



Symbols used in territorial map

Symbol	Group	Label
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
7	7	
*		Indicates a group centroid

Table 10

*Patient Safety Curriculum Content Analysis**

School	Patient-Centered Care	Teamwork and Collaboration	Evidence-Based Practice	Quality Improvement	Safety	Informatics	Method
A	X	X	X	X	X	X	X
B			X		X		X
C		X	X	X			X
D		X		X	X		X
E	X	X	X				X
F			X		X	X	X
G	X	X			X		X

*Content Analysis Rubric Range: 0 x's = school did not have any of the IOM (2003) patient safety core competencies and instructional methodologies noted in curriculum to promote meaningful learning.
7 x's = school had all six of the IOM (2003) patient safety core competencies and instructional methodologies noted in curriculum to promote meaningful learning.

For purposes of the present study, the content analysis presented in Table 10 was completed by comparing the seven participating schools' patient safety curriculum and instructional methodologies to the IOM's (2003) six core competencies for healthcare professionals: (a) patient-centered care, (b) teamwork and collaboration, (c) evidence-based practice, (d) quality improvement, (e) safety, and (f) informatics. Instructional methodologies were reviewed for adult learning concepts and tools (e.g., experiential learning, discourse, and critical reflection/thinking, which would enhance meaningful learning of the six core competencies).

A scoring rubric was constructed for a patient safety curriculum quantitative comparison among the seven participating schools of nursing with a theoretical range from a low score of 0, which indicated the school did not have any of the IOM (Greiner & Knebel, 2003) patient safety core competencies and instructional methodologies noted in the curriculum, to a high score of 7, which indicated that the school had all six of the IOM (Greiner & Knebel) patient safety core competencies and instructional methodologies noted in the curriculum. One school had a score of 7; five schools had a score of 4; and one school had a score of 3. The majority of the schools had a moderate amount of the IOM (Greiner & Knebel) core competencies embedded in their curriculum. The rubric results are presented in Table 11. The findings from the content analysis in this preliminary study supported the evidence from the nursing research conducted by E. L. Smith et al. (2007) in that there are opportunities for improvement for patient safety curriculum in schools of nursing.

There was a wide range of the amount of patient safety curriculum documentation provided by the seven participating schools of nursing. One school sent their entire

program curriculum modules as well as the orientation manual that their nursing students receive from a local hospital district. Several schools forwarded their program of study with only course titles and referenced their website for further course descriptions. The websites were reviewed. A follow-up attempt was made to gain further documentation and information on the schools' patient safety curriculum with many of the liaisons indicating anecdotal information such as: "I doubt that we identify anything too specific" (School B), and "They get patient safety information in a variety of courses. It is almost a thread throughout all courses and then they talk about it in post conference often" (School F). It should be noted that there was a limitation in Phase III due to the unevenness of the data received from the participating schools.

Conclusion

Results from the Phase III content analysis of the patient safety curriculum and instructional methodologies indicated that all seven of the schools of nursing included at least a moderate amount of the IOM (Greiner & Knebel, 2003) core competencies in the curriculum, with one school exhibiting all of the core competencies. The findings from the content analysis in this preliminary study supported the evidence from the nursing research conducted by E. L. Smith et al. (2007) that there are opportunities for improvement in nursing schools' patient safety curriculum.

Research Question 6

The sixth research question under study was, "To what extent are there discernable program curriculum and instructional methodologies that have been traditionally associated with more positive nursing student perception of awareness, skills, and attitudes regarding patient safety?" The results from the Phase III content

analysis provided evidence in support of the research question and indicated that all of the seven schools of nursing that participated in the study included at least a moderate amount of the IOM's six core competencies in their curriculum, with one school exhibiting all of the core competencies. The nursing students' perceptions of awareness, skills, and attitudes regarding patient safety were reflected by the variability of scores on the HPPSACS.

Table 11

Patient Safety Curriculum Content Analysis Rubric Results

School	Score
A	7
B	3
C	4
D	4
E	4
F	4
G	4

Summary

In this chapter, data collected via the HPPSACS and patient safety curriculum content analysis were analyzed and used to examine the six research questions. Demographic data were provided about the study sample and descriptive statistics were presented for the HPPSACS. Results of the data analyses were presented, including exploratory factor analysis, alpha reliability analysis, canonical correlation analysis, discriminant function analysis, and the quantitative rubric results of the patient safety curriculum content analysis. Findings indicated that all six research questions were supported.

Phase I of this study was the administration of a 34-item instrument, the HPPSACS, to a group of 400 scholarly professional nurses to obtain construct validity and internal consistency reliability data on the survey. The instrument assessed the participants' knowledge, skills, and attitudes about patient safety. Of the 400 surveys that were mailed, 150 were completed, for a response rate of 38%, which exceeded Tabachnik and Fidell's (2001) threshold of 115 needed to assure stable factor analytic results. Data from Phase I were factor analyzed to determine underlying factor constructs for the purpose of synthesizing key themes that accounted for the variation in response across 23 survey items. A factor matrix with a three-factor solution produced a meaningful and concise list of constructs representative of the perceptions of patient safety by the scholarly professional nurses' group being studied in the Phase I pilot study. Three factors with themes that were found to relate to perceptions of patient safety among the scholarly professional nurses' group were identified. These themes were: (a) comfort (Factor I); (b) error reporting (Factor II); and (c) denial (Factor III). Alpha estimates for the expected subscales were above or near the range of the recommended level of .70. Specifically, coefficients alpha for scores on the comfort, error reporting, and denial subscales were .86, .62, and .63, respectively. Whereas the coefficient alpha for two of the three subscales are below Nunnally's (1978) criterion of a recommended threshold of .70, these coefficients are reasonable considering the small number of items on each subscale and the exploratory nature of this construct validity analysis.

Phase II was the first substantive component of the study. Upon further review of the HPSACS, it was determined that Items 24 through 28 were limited in scope, thus they were deleted from Phase II. Demographic information was also added to the survey for

Phase II. Sample size was based on Tabachnik and Fidell's (2001) recommendation that at least five respondents per item are needed for a factor analysis. Therefore, a minimum sample size of 115 participants was planned. A snowball sampling process was used to secure participation commitments from seven university and college schools of nursing. Also, the participating schools provided access to their current patient safety curriculum.

Of the 618 surveys that were mailed to the seven universities and colleges of nursing, 318 were returned and completed for a response rate of 51%. These data were used to address research Questions 1 through 5. Of the 318 nursing students completing the surveys, 72% (n = 229) were female; 9.1% (n = 29) were male; and 18.9% (n = 60) did not respond to that particular question. Ages of nursing students ranged from 19 to 60 years, with the mean age of 29 (SD = 8.97); 25.8% (n = 82) did not respond to that particular question. Caucasian nursing students constituted the largest ethnicity represented in the sample with 47.5% (n = 151); 13.8% (n = 44) were Hispanic; 9.1% (n = 29) were African American; 5% (n = 16) reported as *other*; 3.8% (n = 12) were Asian American; 0.3% (n = 1) were Native American; and 20.4% (n = 65) did not respond to that particular question. Due to the low response rate (n = 1) for Native Americans, it was deemed appropriate to collapse that response into the *other* ethnicity category for data analysis purposes. The majority of the nursing students were from associate nursing degree programs of study.

An analysis of the results from the exploratory factor analysis provided evidence in support of the first research question regarding interpretable constructs with responses from the HPPSACS. There were four identifiable factor constructs mined from the study data with themes of comfort, error reporting, denial, and culture. Scores for the entire

instrument and for the four subscales were adequately reliable for an instrument in developmental stages. The appreciable alpha coefficient for scores on the comfort subscale (.82) was especially promising.

An analysis of the results from the alpha reliability coefficients obtained yielded evidence in support of the second research question regarding HPPSACS scores that were internally consistent as indicated by alpha reliability coefficients. Alpha estimates for scores on the expected subscales were above or near the range of the recommended level of .70. Specifically, coefficient alphas for scores on the comfort, error reporting, denial, and culture subscales were .82, .70, .65, and .64, respectively, all of which are appropriate for an instrument in its developmental stages (Pedhazur & Schmelkin, 1991).

An examination of the descriptive statistics in the study provided evidence in support of the third research question regarding the perceptions of nursing students about their awareness, skills, and attitudes regarding patient safety. The statistics provided evidence of variation in responses on the 23-item survey as well as on the four subscales: (a) comfort, (b) error reporting, (c) denial, and (d) culture. The values indicated that participants had much higher agreement with items on the culture and comfort subscales and lower agreement on the error reporting and denial subscales. On average, the nursing students agreed with Question 3 (Healthcare professionals should routinely spend part of their professional time working to improve patient care; $M = 4.35$, $SD = .80$); Question 7 (Learning how to improve patient safety is an appropriate use of time in health programs in school; $M = 4.35$, $SD = .81$); and, most strongly, with Question 9 (In my clinical experiences so far, faculty and staff communicate to me that patient safety is a high priority; $M = 4.35$, $SD = .86$). On average, the nursing students disagreed most strongly

with Question 4 (Only physicians can determine the causes of a medical error; $M = 1.52$, $SD = .78$). The subscale theme results were: (a) comfort ($M = 16.31$, $SD = 4.18$); (b) error reporting ($M = 8.86$, $SD = 2.46$); (c) denial ($M = 7.57$, $SD = 2.30$); and (d) culture ($M = 16.19$, $SD = 2.32$).

A canonical correlation analysis was conducted with results that provided evidence to support the first component of the fourth research question regarding the relationship between the predictor variables of age and gender and the criterion set of nursing students' perceptions of their patient safety awareness, skills, and attitudes. The findings indicated that older male participants had higher comfort subscale scores and lower culture subscale scores than did younger female participants. Younger females were not as comfortable with patient safety issues but were more likely to agree with items relative to the culture of patient safety.

An examination of the second component of the fourth question regarding the relationship between race/ethnicity and the complete set of four HPPSACS subscales was conducted using discriminant function analysis. Because ethnicity was collapsed into five categories and there were four predictive subscales, the analysis yielded four discriminant functions. Two functions were of noteworthy effect size, and the remaining two were negligible in statistical effect and not statistically significant. The results from the discriminant analysis provided evidence in support of this research question. The Asian Americans were clearly distinguished from the combined set of African American and Hispanic participants on the denial and culture scores. The *other* ethnic identity was clearly distinguished from the combined set of Caucasian and Hispanic participants on the comfort and error reporting scores.

A discriminant function analysis was also utilized for the fifth research question regarding the type of collegiate nursing program attended and nursing students' perceptions of their patient safety awareness, skills, and attitudes with evidence in support of this research question. Function 1 most clearly distinguished the associate nursing degree program from the combined set of the accelerated and traditional nursing degree programs.

An ancillary examination was conducted regarding the relationship between the nursing students' perceptions of their patient safety awareness, skills, and attitudes and the seven participating schools of nursing in this study using discriminant function analysis. Interestingly, Function 1 most clearly distinguished the schools having associate nursing degree programs from the combined set of schools with accelerated and traditional nursing degree programs.

Phase III was the second substantive component of the study. This phase consisted of a content analysis of the patient safety curriculum and instructional methodologies among the participating schools of nursing as compared with the IOM's (2003) six core competencies: (a) patient-centered care, (b) teamwork and collaboration, (c) evidence-based practice, (d) quality improvement, (e) safety, and (f) informatics. A scoring rubric was created for a quantitative comparison. It should be noted that there was a limitation in Phase III due to the unevenness of the data received from the participating schools of nursing. The findings in this phase provided evidence to support the sixth research question regarding discernable program curriculum and instructional methodologies that have been traditionally associated with more positive nursing student perceptions of awareness, skills, and attitudes regarding patient safety. All seven of the

schools of nursing that participated in the study included at least a moderate amount of the IOM's six core competencies in their curriculum, with one school exhibiting all of the core competencies. The nursing students' perceptions of awareness, skills, and attitudes regarding patient safety were reflected by the variability of scores on the HPPSACS.

Chapter 5 provides a summary of the findings and a discussion regarding the implications of the study. The theoretical framework upon which the study was formulated will be linked to the study's findings. The chapter concludes with comments regarding future research related to this study.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of the present study was to gain a better understanding of the current status of patient safety awareness among pre-licensure students. In this final chapter, the methodology employed is reviewed. Next, a summary of the findings is presented and discussed in light of the theoretical framework posited in chapter 2 of this study. Conclusions are drawn and recommendations are made for future research. The chapter concludes with the contributions the study has made to the field of nursing education.

Review of the Methodology

This exploratory quantitative study used a survey research design to examine current patient safety education for nursing students and provide recommendations for improving patient safety education in the academic nursing curriculum with the goal of enhancing health outcomes for patients. The study consisted of three phases. In Phase I, a pilot study was conducted to determine validity and reliability data of the HPPSACS; and to determine the appropriateness of its use with registered nurse and pre-licensure nursing students, the HPPSACS was administered to a group of 400 scholarly professional nurses after approval was obtained from the Institutional Review Board at the University of North Florida. Confidentiality and protection of human subjects were maintained. Return of the survey indicated consent to participate in the study. There were 150 participants in Phase I. The 34-item instrument used in this study was an adapted version of the Patient Safety/Medical Fallibility Assessment Pre and Post Curriculum

Survey created by the University of Missouri-Columbia School of Medicine (Madigosky et al., 2006) for use with medical students. Participants completed their surveys for Phase I in October 2006.

Phase II and Phase III were the substantive components of the study. Upon further review of the HPPSACS it was determined that Items 24 through 28 (i.e., the factual items) were limited in scope and these items were deleted from Phase II. Demographic items were also added to the questionnaire for Phase II. After receiving approval from the Institutional Review Board at the University of North Florida, a snowball sampling process was used to secure participation commitments from seven university and college schools of nursing. Also, the participating schools provided access to their current patient safety curriculum. The school liaison at each school administered the HPPSACS to the nursing students at each school. Confidentiality and protection of human subjects were maintained. No student names were requested. Return of the survey indicated consent to participate in the study. There was no penalty to the students for choosing not to participate. Participants completed their surveys in April 2007. Of the 618 surveys that were mailed to the seven university and college schools of nursing, 318 were returned completed for a response rate of 51%.

Phase III consisted of a qualitative content analysis that was completed by comparing the seven participating schools' patient safety curriculum and instructional methodologies to the IOM's (Greiner & Knebel, 2003) six core competencies for healthcare professionals. A scoring rubric was constructed for a patient safety curriculum quantitative comparison among the seven participating schools of nursing. It should be

noted that there was a limitation in Phase III due to the unevenness of the data received from the participating schools of nursing.

The independent or predictor variables were age, gender, race/ethnicity, program of study, and schools. The dependent or criterion variables were the perceptions of patient safety awareness, skills, and attitudes as measured by scores on the four subscales of the HPPSACS.

Summary of the Results

Overall, the findings from the present study provide a clear understanding of the current status of patient safety awareness among pre-licensure nursing students. Findings for the research questions follow.

The first research question under study was, "Will interpretable constructs be identified when responses to the HPPSACS are intercorrelated and factor analyzed using R-technique exploratory factor analysis?" The results from the exploratory factor analysis provided evidence in support of this research question. There were four identifiable factor constructs based on the data from Phase II of the study with themes of comfort, error reporting, denial, and culture. Scores for the entire instrument and for the four subscales were considered adequately construct valid for an instrument in developmental stages.

The second research question under study was, "Will responses to items on the HPPSACS yield scores that are internally consistent as indicated by alpha reliability coefficients?" The alpha reliability coefficients obtained yielded evidence in support of this research question. Alpha estimates for scores on the expected subscales were above or near the range of the recommended level of .70 (Nunnally, 1978). Specifically, coefficients alpha for scores on the comfort, error reporting, denial, and culture subscales

were .82, .70, .65, and .64, respectively, all of which are appropriate for an instrument in its developmental stages (Pedhazur & Schmelkin, 1991).

The third research question under study was, "What are the perceptions of nursing students about their awareness, skills, and attitudes regarding patient safety?" The descriptive statistics of the nursing students' responses on the HPPSACS provided the evidence for this research question. The statistics provided evidence of variation in responses on the full-scale 23-item survey as well as for responses on the four subscales: (a) comfort, (b) error reporting, (c) denial, and (d) culture. These variations in the perceptions of nursing students' awareness, skills, and attitudes regarding patient safety can be noted from the data results from the study in Phase II. Generally, the participants' perceptions reflected a sensitivity to their own role (i.e., their responsibility for patient safety) as well as a general range of opinions about other matters relative to patient safety.

The fourth question (part a) under the study was, "To what extent is there a relationship between the demographic variables of age and gender and nursing students' perceptions of their patient safety awareness, skills, and attitudes?" The effects of age and gender on the HPPSACS were examined using canonical correlation analysis. The results from the canonical correlation analysis provided evidence for this research question in that older male participants had higher comfort subscale scores and lower culture subscale scores than did younger female participants. Younger females were not as comfortable with patient safety issues but were more likely to agree with items relative to the culture of patient safety.

The fourth question (part b) under the study was, "To what extent is there a relationship between the demographic variable of race/ethnicity and nursing students' perceptions of their patient safety awareness, skills, and attitudes?" The effect of race/ethnicity as a dependent variable set was examined using discriminant analysis. The results from the discriminant analysis provided evidence in support of this research question. The Asian Americans were clearly distinguished from the combined set of African American and Hispanic participants on the denial and culture scores. The *other* ethnic identity was clearly distinguished from the combined set of Caucasian and Hispanic participants on the comfort and error reporting scores.

The fifth research question under study was, "To what extent is there a relationship between the type of collegiate nursing program and nursing students' perceptions of their patient safety awareness, skills, and attitudes?" The results from the discriminant analysis provided the evidence for this research question. The associate nursing degree programs were clearly distinguished from those in the combined set of the accelerated and traditional nursing degree programs.

An ancillary analysis was conducted to examine the relationship between the seven participating schools of nursing in this study and nursing students' perceptions of their patient safety awareness, skills, and attitudes using discriminant function analysis. Function 1 most clearly distinguished participants in the associate nursing degree programs from the combined set of accelerated and traditional nursing degree programs, with associate nursing degree programs having higher error reporting and comfort scores.

The sixth research question under study was, "To what extent are there discernable program curriculum and instructional methodologies that have been

traditionally associated with more positive student perception of awareness, skills, and attitudes regarding patient safety?" The results from the Phase III content analysis provided evidence in support of the research question: All of the seven schools of nursing that participated in the study included at least three the IOM's six core competencies (patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics) in their curriculum. One school exhibited all of the core competencies. The nursing students' perceptions of awareness, skills, and attitudes regarding patient safety were reflected by the variability of scores on the HPPSACS.

Discussion of the Results

The findings of the present study will be discussed here in relation to past research and to the theoretical framework upon which the study was based. Limitations of the research instrument employed in the study also will be addressed.

Relationship of the Present Study to Previous Research

There is an extensive amount of patient safety literature documenting the importance of the topic since its emergence in the mid-1990s; however, there has been little empirical research documenting an evidence-based patient safety education program in academic nursing curriculum and little research documenting that such a program has improved health outcomes. There is currently more research available on patient safety curriculum in medical students' programs than for nursing programs. One medical student program, for example, has successfully implemented a comprehensive and multidisciplinary safety curriculum to address the ACGME's core competencies and to establish a culture of safety for sustainable improvement in healthcare through integration of safety into the students' daily activities (Singh et al., 2005). A needs assessment of the

students in that program based on their knowledge and prior exposure to patient safety issues indicated that few had received any formal safety training and all had a poor knowledge base. To date, there are no known empirical studies that have been conducted regarding nursing students' perceptions about their awareness, skills, and attitudes regarding patient safety. Hence, the findings from the present study are particularly useful in examining nurses' understanding of patient safety.

Linda Aiken and her colleagues at the Center for Health Outcomes and Policy Research at the University of Pennsylvania have conducted empirical research exploring the relationships between nurses' educational levels (Aiken, Clarke, Cheung, et al., 2003; Aiken, Clarke, Silber, et al., 2003; Long et al., 2004) and the work environment (Aiken, 2002, 2003; Aiken, Clarke, Sloane, & Sochalski, 2001; Aiken, Clarke, Sloane, Sochalski, et al., 2001; Rafferty et al., 2001), and the impact that those conditions have on patients' health outcomes—with some statistically significant findings. In particular, Aiken, Clarke, Cheung, et al.'s (2003) study provided empirical evidence that hospitals' employment of nurses with BSN and higher degrees was associated with improved patient outcomes. It is noteworthy that in the present study, it was the associate nursing degree students who had higher scores in the factor constructs of comfort and error reporting.

Research has been published in a recent report released by the IOM (Page, 2004) that indicates patient safety continues to be endangered in healthcare organizations across the country, and a key factor in this risk is the nursing work environment in which patients receive care. Nurses are the first line of defense in keeping patients safe, and the less nursing time provided to patients, the poorer the patients' outcomes are likely to be.

However, the overall conditions in which many nursing staff function are not conducive to delivering effective, safe care and services (Page). This is relevant not only for staff nurses, but also for those responsible for staff development, quality assurance, and nursing education. This report had significant findings with application to the design of the present study. The nursing research obtained in the IOM report (Page) can be used to build the clinical knowledge base, and can be incorporated into current patient safety curriculum and research to improve health outcomes.

E. L. Smith et al. (2007), as part of the Robert Wood Johnson Foundation funded QSEN project, conducted a survey to assess levels of integration of quality and safety content in pre-licensure nursing curricula. The results of the survey from 195 nursing program leaders indicated that, at face value, there were high percentages of schools that reported inclusion of the QSEN core competencies (patient-centered care, teamwork and collaboration, and safety) using a variety of pedagogical strategies. Greater numbers of schools (but still a minority) reported that they would like more content in informatics, quality improvement, and evidence-based practice. Cronenwett et al. (2007) reported, however, that the QSEN faculty focus groups, upon reviewing the knowledge, skills, and attitudes for the competencies, had markedly different reactions from what was reported in the survey data from E. L. Smith et al.'s survey:

> Although the faculty agreed that they *should* be teaching these competencies and, in fact, had thought they *were*, focus group participants did not understand fundamental concepts related to the competencies and could not identify pedagogical strategies in use for teaching the KSAs. (p. 126)

The findings in the Phase III content analysis of the present study of the patient safety curriculum and instructional methodologies indicated that all seven of the schools of nursing that participated had at least three of the IOM's (Greiner & Knebel, 2003) six core competencies as identified by E. L. Smith et al. (2007): (a) patient-centered care, (b) teamwork and collaboration, (c) evidence-based practice, (d) quality improvement, (e) safety, and (f) informatics, embedded in their curriculum. One school exhibited all of the core competencies in its curriculum. E. L. Smith et al.'s QSEN project and its research focus is particularly relevant to the present study in that the results from the content analysis in the present study supported the evidence from the nursing research, indicating that there are improvement opportunities for patient safety curriculum in schools of nursing. This has broad implications for policymakers, nursing leaders, and academia.

Interpretation of Results Within the Theoretical Framework

The issues of patient safety and medical errors as addressed in the present study have been well documented in a series of national studies by the IOM of the National Academies (Greiner & Knebel, 2003; IOM, 2001; Page, 2004). The high rate of errors is a complex issue, with many underlying causes. It is clearly a symptom of a broken system. The IOM (Greiner & Knebel) concluded that education for healthcare professionals is in need of a major overhaul, and that "clinical education simply has not kept pace with or been responsive enough to shifting patient demographics and desires, changing health system expectations, evolving practice requirements and staffing arrangements, new information, a focus on improving quality, or new technologies" (p. 1).

Health Professions Education: A Bridge to Quality, a report of the IOM (Greiner & Knebel, 2003), recommended an overarching vision for all programs and institutions engaged in the education of healthcare professions and that "all health professions 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). Embedded in the IOM's (Greiner & Knebel) report are two significant reforms that were noteworthy in designing the present study: (a) a shift to a competency-based approach to education for all healthcare professionals; and (b) the core competencies identified as essential for healthcare professionals to respond to patients' care.

As a response to the IOM quality and safety challenge, Cronenwett et al. (2007), with funding from the Robert Wood Johnson Foundation, proposed a conceptual framework (QSEN) for pre-licensure nursing students with six core competencies: (a) patient-centered care, (b) teamwork and collaboration, (c) evidence-based practice, (d) quality improvement, (e) safety, and (f) informatics with related knowledge, skills, and attitudes to be met by nursing students for competency as a respected nurse. The proposed competency definitions were developed with the goal of being expansive enough to be used as frameworks for educational programs, licensure, and certification for all registered nurses (E. L. Smith et al., 2007).

The theoretical framework for the present study was based on the IOM's (Greiner & Knebel, 2003) vision and the recommendations that Cronenwett et al. (2007) put forth in the QSEN project outlining six core competencies for pre-licensure nursing students: (a) patient-centered care, (b) teamwork and collaboration, (c) evidence-based practice, (d)

quality improvement, (e) safety, and (f) informatics. Phase III of the present study examined the seven participating nursing schools' patient safety curriculum and instructional methodologies to determine if the six core competencies were exhibited. Instructional methodologies were reviewed for adult learning concepts and tools, such as experiential learning, discourse, and critical reflection/thinking, which would enhance meaningful learning of the six core competencies. A scoring rubric was constructed for a patient safety curriculum quantitative comparison among the seven participating schools of nursing, with a theoretical range of a low score of 0, which indicated the school did not have any of the IOM (Greiner & Knebel) patient safety core competencies and instructional methodologies noted in the curriculum, to a high score of 7, which indicated that the school had all six of the IOM (Greiner & Knebel) patient safety core competencies and instructional methodologies noted in curriculum. One school had a score of 7; five schools had a score of 4; and one school had a score of 3. The majority of the schools of nursing had a moderate amount of the IOM (Greiner & Knebel) core competencies embedded in their current curriculum. The findings from the content analysis in the present study supported the evidence from the nursing research conducted by E. L. Smith et al. (2007) in the QSEN project in that there are opportunities for improvement for patient safety curriculum in schools of nursing.

Limitations of the Research Instrument

The study's intent was to gain a better understanding of the current status of patient safety awareness among pre-licensure nursing students. As previously mentioned, to date, there are no known empirical studies that have been conducted regarding nursing students' perceptions about their awareness, skills, and attitudes regarding patient safety;

therefore, there was no available research instrument with adequate validity and reliability evidence to measure this phenomenon. The 34-item instrument used in this study is an adapted version of the Patient Safety/Medical Fallibility Assessment Pre and Post Curriculum Survey created by the University of Missouri-Columbia School of Medicine (Madigosky et al., 2006) for use with medical students. Several of the original items in the survey were revised to make it relevant to the nursing student sample population in the present study. After administration of the HPPSACS in Phase I of the pilot study to 400 scholarly professional nurses, the instrument was further reviewed and it was determined that Items 24 through 28 were limited in scope. These items were deleted for Phase II. Detailed institutional liaison guidelines (Appendix G) were given to each liaison at the seven participating university and college schools of nursing that provided instruction on the administration of the survey. Though follow-up communication occurred with the liaisons, encouraging them to point out the request for demographic information on the last page of the survey to the nursing students, many surveys were returned completed except for the demographic information. It was difficult to ascertain whether this was due to an oversight on the part of the participants or whether it, perhaps, had been their intent not to complete the demographic information.

Respondents were asked to indicate their levels of agreement/disagreement on a Likert-type scale on the survey for Items 1 through 23 as 5 (*strongly agree*), 4 (*agree*), 3 (*neutral*), 2 (*disagree*), and 1 (*strongly disagree*). Items 24 through 29 of the survey consisted of questions to which the respondents were to reply either *yes* or *no* regarding patient safety situations that they might have previously experienced (see Appendix F for the text of the HPPSACS).

The HPPSACS data were factor analyzed to determine underlying factor constructs for the purpose of synthesizing key themes that accounted for variation in response across 23 survey items. Four factors with themes were identified in relation to perceptions of patient safety among the nursing students. These themes were: (a) comfort (Factor I); (b) error reporting (Factor II); (c) denial (Factor III); and (d) culture (Factor IV). The HPPSACS yielded several items that were not irrelevant to the survey's findings; therefore, the survey could be reviewed further for possible item revision. Specifically, more items conceptually consistent with the four derived subscales could be constructed. The revised instrument could then be used in additional psychometric integrity studies.

Conclusions and Recommendations

The findings of the present study led to conclusions, recommendations for nurse educators, and recommendations for future research on patient safety education in the nursing curriculum.

Conclusions

The results of the present study indicate that a clear understanding of the current status of patient safety awareness was obtained among pre-licensure nursing students with the administration of the HPPSACS. Phase II was a substantive component of the study. Exploratory factor analysis yielded four factors with themes that were found to be related to perceptions of patient safety among the nursing students which include: (a) comfort (Factor I); (b) error reporting (Factor II); (c) denial (Factor III); and (d) culture (Factor IV). Descriptive statistics indicated that the nursing students' held opinions about their role regarding patient safety as evidence by the variance of scores on the HPPSACS.

The canonical correlation analysis provided evidence to support that there are age and gender opinion variations regarding patient safety awareness, skills, and attitudes among nursing students. Older male participants had higher comfort subscales and lower culture subscale scores than did younger female participants. Possibly this finding might be related to a difference in maturation level between the older male participants and younger female participants. Also, the older male participants might have had a previous career, for example in the military or in business, in which administrative skills would have already been developed for them to experience a comfort with safety values.

A discriminant function analysis provided evidence to support the variation found among race/ethnicity and perceptions of patient safety. Asian Americans were clearly distinguishable from the combined set of African Americans and Hispanics, with Asian Americans having higher denial and culture scores. There were also distinguishable variations among the *other* race/ethnic participants from the combined set of Caucasian and Hispanic participants, with those of *other* ethnicity having higher comfort and error reporting scores. Perhaps this finding might be related to other distinguishable ethnic variations among the participants.

Discriminant analysis yielded evidence to support that the perceptions of patient safety awareness, skills, and attitudes among nursing students who were participants in associate nursing degree programs were distinguishable from the combined set of the accelerated and traditional nursing degree programs. The nursing students from the associate nursing degree programs had higher error reporting and comfort scores. Discriminant analysis results indicated that schools having an associate nursing degree were distinguishable from the combined set of schools with accelerated and traditional

nursing degree programs. The schools with associate nursing degree programs had higher error reporting and comfort scores. Perhaps this finding might be associated with the fact that the participants in the associate nursing degree programs become involved with the nursing core courses and clinical rotations within the first 2 years of their program so there may be a greater up-front expectation for success placed upon them.

Phase III was the second substantive component of the study. This phase consisted of a content analysis of the patient safety curriculum and instructional methodologies among the participating schools of nursing as compared with the IOM's (Greiner & Knebel, 2003) core competencies: (a) patient-centered care, (b) teamwork and collaboration, (c) evidence-based practice, (d) quality improvement, (e) safety, and (f) informatics. A scoring rubric was created for a quantitative comparison. The findings in this phase provided evidence that all seven of the participating schools of nursing included at least three of the IOM's (Greiner & Knebel) six core competencies in their curriculum, with one school exhibiting all of the core competencies. The nursing students' perceptions of awareness, skills, and attitudes regarding patient safety were reflected by the variability of scores on the HPPSACS.

Recommendations for Nurse Leaders and Educators

The recommendations for nurse leaders and educators are broad in scope to address patient safety in the nursing curriculum and include policy development and approval of competencies at the national and state level, which will involve academic nurse credentialing organizations, state boards of nursing, and the university and college schools of nursing. Stakeholders, therefore, include patients, nursing students, academic faculty, and healthcare organizations. National conferences and meetings at the local

level will need to occur for communication to be provided to the higher education institutions regarding the competencies, instructional methodologies, and learning outcomes assessment. It is important that academic nurse leaders embrace the patient safety movement as a positive initiative with the goal of improving health outcomes. Each school of nursing should be involved with the development and implementation of the patient safety curriculum and adult learning concepts and tools to successfully promote meaningful learning of the content domain. Deans and department chairs of nursing should organize and schedule faculty training to promote comfort with teaching the new patient safety curriculum to their students. Educators should be prepared for the time and cost commitment of faculty training and the purchase of instructional materials. Many nursing departments are currently dealing with the effects of the nursing shortage so there may be time constraints and challenges to overcome in the patient safety curriculum implementation.

One of the IOM (Greiner & Knebel, 2003) six core competencies is teamwork and collaboration so it is critical to include other healthcare students at the university and college in multidisciplinary experiential learning. It would also be advantageous for the college community to involve faculty from other departments (e.g., psychology, education, and business) to become involved in patient safety research and instructional opportunities for the students. Offering core quality/patient safety courses would benefit healthcare students in various programs of study. Grant funds are available in such areas as information technology innovation as it relates to patient safety, which could serve as a springboard for future education. Obtaining such a grant would not only be of financial reward to the higher education institution, but would also help the institution build its

reputation, thereby increasing enrollments as more students were drawn to the school's higher status.

It is essential that nurse leaders in healthcare organizations become sensitive to the new patient safety knowledge that would come from the nursing students. This would present a wonderful recruitment opportunity to obtain the highest qualified staff, ultimately benefiting the organization's financial bottom line through the resulting risk reduction and decreasing of medical errors. Curriculum development and training can be done for continuing education programs so that registered nurses and other healthcare professionals could benefit by learning the enhanced skill set in quality and patient safety. The overarching vision for the introduction of patient safety in the nursing curriculum is that health outcomes will improve, lives will be saved, and it will positively impact the country's health system.

Recommendations for Future Research

The present study is the first known study conducted on nursing students' perceptions about their awareness, skills, and attitudes regarding patient safety. While this study considered six research questions, there are significant opportunities for future research in patient safety given the limited empirical studies that have been done thus far. This study examined nursing students' awareness, skills, and attitudes regarding patient safety that were in associate nursing degree, accelerated nursing degree, or traditional nursing degree programs of study.

One recommendation for future research study be to continue to build on the findings from the present study and examine patient safety awareness among students in associate, baccalaureate, master's, and doctoral nursing degree programs of study. This

study would include an assessment of adult learning concepts and tools to promote meaningful learning in the patient safety domain. Longitudinal research studies could be conducted to ascertain if patient safety awareness increases with practitioner maturation and skill development, and whether the patient safety awareness is carried into professional practice.

A second recommendation for future study would be an examination of patient safety awareness conducted with the nursing faculty, particularly as it relates to their students' patient safety awareness. For example, high patient safety awareness among nursing faculty might correlate to high patient safety awareness among their students. Such a study might administer the HPPSACS to the nursing faculty and their students for comparison.

Finally, a recommendation for a future research study would be to develop a a design method whereby learning outcomes would be measured as they relate to health outcomes to demonstrate that patient safety knowledge and skills obtained by the nursing students have a positive effect for their patients. An analysis of the nursing students' patient safety curriculum and instructional methodologies would be conducted to determine whether there was a positive correlation to their learning outcomes (i.e., patient safety knowledge and successful competency completion) as compared to health outcomes indicators such as medical errors and near miss reports.

Contributions of the Study

The present study is the first known research conducted on nursing students' perceptions about their awareness, skills, and attitudes regarding patient safety, which is perhaps the study's most significant contribution to the field of nursing education.

Further, the sample size was relatively large ($n = 318$) and encompassed a diverse group of respondents from associate, accelerated, and traditional nursing degree programs. It is the only known study on the current status of patient safety awareness among pre-licensure nursing students. The design of this study offers future nurse researchers a basis upon which to conduct further empirical research on nursing students' perceptions of their patient safety awareness, skills, and attitudes at any institution of higher education.

The findings from the present study support the evidence from the nursing research conducted by E. L. Smith et al. (2007) that there are opportunities for improvement for patient safety curriculum in schools of nursing. These findings emphasize that new ways of thinking, interacting, and learning can be addressed through adult learning concepts, tools, and instructional methodologies to enhance patient safety awareness, skills, and attitudes. In so doing, the level of clinical excellence can be raised, medical error prevention can be addressed, and health outcomes can be improved.

Appendix A

HPPSACS (Phase 1)

Healthcare Professionals Patient Safety Assessment

Curriculum Survey **(Phase I)**

Instructions

Circle the number on the answer sheet that corresponds to

your level of agreement with the following statements:

	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
1. Making errors in healthcare is inevitable.	1	2	3	4	5
2. Competent healthcare professionals do not make medical errors that lead to patient harm.	1	2	3	4	5
3. Healthcare professionals should routinely spend part of their professional time working to improve patient care.	1	2	3	4	5
4. Only physicians can determine the causes of a medical error.	1	2	3	4	5
5. Healthcare professionals should not tolerate uncertainty in patient care.	1	2	3	4	5
6. The culture of healthcare makes it easy for healthcare professionals to deal constructively with errors.	1	2	3	4	5
7. Learning how to improve patient safety is an appropriate use of time in health programs in school.	1	2	3	4	5
8. Healthcare professionals routinely share information about medical errors and what caused them.	1	2	3	4	5
9. In my clinical experiences so far, faculty and staff communicate to me that patient safety is a high priority.	1	2	3	4	5
10. Healthcare professionals routinely report medical errors.	1	2	3	4	5
11. Reporting systems do little to reduce future errors.	1	2	3	4	5
12. Physicians should be the healthcare professionals that report errors to an affected patient and their family.	1	2	3	4	5
13. Effective responses to errors focus primarily on the healthcare professional involved.	1	2	3	4	5

14. If there is no harm to a patient, there is no need to address an error.	1	2	3	4	5
15. If I saw a medical error, I would keep it to myself.	1	2	3	4	5
16. Most errors are due to things that healthcare professionals can't do anything about.	1	2	3	4	5
17. After an error occurs, an effective strategy is to work harder to be more careful.	1	2	3	4	5
18. There is a gap between what we know as 'best care' and what we provide on a day to day basis.	1	2	3	4	5

Instructions

Circle the number on the answer sheet that corresponds to

your level of comfort with doing the following:

	Very Uncomfortable	Uncomfortable	Neutral	Comfortable	Very Comfortable
19. Accurately completing an incident report.	1	2	3	4	5
20. Analyzing a case to find the causes of an error.	1	2	3	4	5
21. Supporting and advising a peer who must decide how to respond to an error.	1	2	3	4	5
22. Disclosing an error to a faculty member.	1	2	3	4	5
23. Disclosing an error to another healthcare professional.	1	2	3	4	5

Instructions

Circle the number on the answer sheet that corresponds to your best answer:

24. According to the Institute of Medicine's *To Err is Human* report, more than _____ preventable adverse events occur in US hospitals each year:
    1) One thousand
    2) One hundred thousand
    3) One million
    4) One hundred million

25. Adverse events occur in ___ % of hospitalizations:
    1) 0.02-0.04%
    2) 0.2-0.4%
    3) 2-4%
    4) 20-40%

26. Successful error reporting systems are most often:
    5) Confidential and punitive
    6) Confidential and non-punitive
    7) Non-confidential and punitive
    8) Non-confidential and non-punitive

27. Latent factors are:
    a. Factors that have effects that are delayed
    b. Factors that happen later, after the fact
    c. Factors that do not affect anything
    d. Factors that affect things immediately

28. At healthcare facilities, medical errors can be reported to the Risk Management Department by:
    a. Physicians only
    b. Physicians and staff
    c. Physicians, staff, and patients
    d. Physicians, staff, healthcare students, patients and visitors

In the past:

29. Have you observed a medical error in your clinical experiences? 1) Yes 2) No

30. Have you disclosed a medical error to a faculty member? 1) Yes 2) No

31. Have you disclosed a medical error to a staff member? 1) Yes 2) No

32. Have you disclosed a medical error to a fellow student? 1) Yes 2) No

33. Have you reported an error using an incident report? 1) Yes 2) No

34. Did your nursing program of study provide sufficient coverage on the topic of patient safety?
    1) Yes 2) No

Comments:

Appendix B

Request to Use Adapted Instrument

Request Permission to Use Adapted Instrument

Again, it will change the connotation of some of the questions but I think it would be fine to do so if the survey would meet your needs better with revisions.
You can then indicate that the survey was 'adapted' from ours.
I haven't heard back from my MU colleagues about the RN survey results but I did forward our email exchange to them to prompt a discussion about it. I'll let you know what comes of that!
Wendy

From: Teri Chenot [mailto:TChenot@bellsouth.net]
Sent: Tuesday, May 16, 2006 7:03 PM
To: Madigosky, Wendy
Subject: Re: University of Missouri study

Thanks Wendy. Would there be any problem from your end if some of the questions were revised to reflect nursing students (rather than residents)? Have you ever heard from your colleagues how their nursing study went? Teri
----- Original Message -----
From: Wendy.Madigosky@UCHSC.edu
To: TChenot@bellsouth.net
Sent: Tuesday, May 16, 2006 8:43 PM
Subject: RE: University of Missouri study

Formal approval so granted. Please just reference our work (article) and attribute the survey to us.
Congrats and good luck with the study!

Wendy Madigosky

From: Teri Chenot [mailto:TChenot@bellsouth.net]
Sent: Sunday, May 14, 2006 8:21 AM
To: Madigosky, Wendy
Subject: Re: University of Missouri study

Hi Wendy - Hope you are doing well. I am now a doctoral candidate having passed my qualifying exams and moving onto dissertation. Would I need to get official approval from you to use the survey that you used? Please advise - thanks. Teri
----- Original Message -----
From: Wendy.Madigosky@UCHSC.edu
To: TChenot@bellsouth.net
Sent: Monday, March 20, 2006 11:46 AM
Subject: RE: University of Missouri study

Appendix C

Request for Access (Phase 1)

Request for Access (Phase I)

9/11/06

Dear Nursing Colleague:

I would very much appreciate your participation in a pilot study as the first phase for my doctoral dissertation at the University of North Florida. The purpose of the first phase is to assess nurses' knowledge, skills, and attitudes about patient safety. I am requesting that you allow me to use 15 minutes of your time to collect data for this study. A copy of the patient safety assessment survey and a stamped return envelope is included in your information packet.

Your confidentiality will be protected, as no names, social security numbers or any other information that could reveal the identity of the nurses that participate in the study will be published and only aggregate data will be reported. All research materials will be kept in a secured file.

If you are willing to participate then please complete the enclosed patient safety assessment survey according to the instructions on that document and send back to me in the enclosed stamped return envelope by October 13, 2006. Please feel free to contact me with any questions at (904) 998-0707. Thank you very much for your consideration and for your participation in this study.

Please contact Dr. Kathleen Bloom, Chair, UNF Institutional Review Board, (904) 620-2684 for any questions about the research project.

Sincerely,

Teri M. Chenot, M.S., M.Ed., R.N.
Doctoral Candidate -
University of North Florida

Appendix D

UNF Institutional Review Board Approval (Phase 1)

UNF
UNIVERSITY of
NORTH FLORIDA.

Division of Sponsored Research and Training
4567 St. Johns Bluff Road South
Jacksonville, FL 32224-2665
904-620-2455 FAX 904-620-2457
Equal Opportunity/Equal Access/Affirmative Action Institution

MEMORANDUM

DATE: September 18, 2006

TO: Teri M. Chenot

VIA: Dr. Larry Daniel,
Education and Human Services

FROM: Dr. Kathaleen Bloom, Chair,
UNF Institutional Review Board

RE: Review by the UNF Institutional Review Board IRB#06-125:
"Healthcare Professionals Patient Safety Assessment"

This is to advise you that your project, "Healthcare Professionals Patient Safety Assessment," has been reviewed on behalf of the UNF Institutional Review Board and has been declared exempt from further IRB review.

This approval applies to your project in the form and content as submitted to the IRB for review. Any variations or modifications to the approved protocol and/or informed consent forms as they relate to dealing with human subjects must be cleared with the IRB prior to implementing such changes.

Should you have any questions regarding your project or any other IRB issues, please contact Nicole Sayers, Coordinator of Research Compliance, at 620-2498.

Thank you.

c: Dr. Joyce Jones, Leadership, Counseling and Technology Chair

Appendix E

CITI Course Completion Record

CITI Course in The Protection of Human Research Subjects

Print This Report

Saturday, August 19, 2006

CITI Course Completion Record # 280011
for Teri Chenot

To whom it may concern:

On *5/20/2006*, *Teri Chenot* (username=tchenot) completed all *CITI Program* requirements for the *Basic CITI* Course in The Protection of Human Research Subjects.

Learner Institution: *University of North Florida*

Learner Group: *Group 2*

Learner Group Description: *Social Behavioral Reseacher Investigators and Key Personnel*

Contact Information:

Gender: Female
Department: Education
Which course do you plan to take?: Social And Behavioral Investigator Course Only
Role in human subjects research: Principal Investigator
Mailing Address:
8637 Royalwood Drive
Jacksonville
FL
32256
USA
Email: tchenot@bellsouth.net
Office Phone: 9049980707
Home Phone: 9049980707

The Required Modules for *Group 2* are: **Date completed**

Introduction	05/14/06
History and Ethical Principles - SBR	05/14/06
Defining Research with Human Subjects - SBR	05/14/06
The Regulations and The Social and Behavioral Sciences - SBR	05/14/06
Assessing Risk in Social and Behavioral Sciences - SBR	05/14/06
Informed Consent - SBR	05/14/06
Privacy and Confidentiality - SBR	05/16/06
Research with Prisoners - SBR	05/16/06
Research with Children - SBR	05/17/06
Research in Public Elementary and Secondary Schools - SBR	05/17/06
International Research - SBR	05/18/06
Internet Research - SBR	05/18/06
Human Subjects Research at the VA	05/19/06
HIPAA and Human Subjects Research	05/19/06
Workers as Research Subjects-A Vulnerable Population	05/19/06
Hot Topics	05/20/06
Conflicts of Interest in Research Involving Human Subjects	05/20/06
University of North Florida	05/20/06

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Course Coordinator

CR# 280011

Appendix F

HPPSACS (Phase II and Phase III)

Healthcare Professionals Patient Safety Assessment

Curriculum Survey **(Phase II and Phase III)**

Instructions

Circle the number on the answer sheet that corresponds to

your level of agreement with the following statements:

	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
1. Making errors in healthcare is inevitable.	1	2	3	4	5
2. Competent healthcare professionals do not make medical errors that lead to patient harm.	1	2	3	4	5
3. Healthcare professionals should routinely spend part of their professional time working to improve patient care.	1	2	3	4	5
4. Only physicians can determine the causes of a medical error.	1	2	3	4	5
5. Healthcare professionals should not tolerate uncertainty in patient care.	1	2	3	4	5
6. The culture of healthcare makes it easy for healthcare professionals to deal constructively with errors.	1	2	3	4	5
7. Learning how to improve patient safety is an appropriate use of time in health programs in school.	1	2	3	4	5
8. Healthcare professionals routinely share information about medical errors and what caused them.	1	2	3	4	5
9. In my clinical experiences so far, faculty and staff communicate to me that patient safety is a high priority.	1	2	3	4	5
10. Healthcare professionals routinely report medical errors.	1	2	3	4	5
11. Reporting systems do little to reduce future errors.	1	2	3	4	5
12. Physicians should be the healthcare professionals that report errors to an affected patient and their family.	1	2	3	4	5
13. Effective responses to errors focus primarily on the healthcare professional involved.	1	2	3	4	5
14. If there is no harm to a patient, there is no need to address an error.	1	2	3	4	5

15. If I saw a medical error, I would keep it to myself.	1	2	3	4	5
16. Most errors are due to things that healthcare professionals can't do anything about.	1	2	3	4	5
17. After an error occurs, an effective strategy is to work harder to be more careful.	1	2	3	4	5
18. There is a gap between what we know as 'best care' and what we provide on a day to day basis.	1	2	3	4	5

Instructions

Circle the number on the answer sheet that corresponds to your level of comfort with doing the following:

	Very Uncomfortable	Uncomfortable	Neutral	Comfortable	Very Comfortable
19. Accurately completing an incident report.	1	2	3	4	5
20. Analyzing a case to find the causes of an error.	1	2	3	4	5
21. Supporting and advising a peer who must decide how to respond to an error.	1	2	3	4	5
22. Disclosing an error to a faculty member.	1	2	3	4	5
23. Disclosing an error to another healthcare professional.	1	2	3	4	5

Instructions

Circle the number on the answer sheet that corresponds to your best answer:

In the past:

24. Have you observed a medical error in your clinical experiences? 1) Yes 2) No
25. Have you disclosed a medical error to a faculty member? 1) Yes 2) No
26. Have you disclosed a medical error to a staff member? 1) Yes 2) No
27. Have you disclosed a medical error to a fellow student? 1) Yes 2) No
28. Have you reported an error using an incident report? 1) Yes 2) No
29. Did your nursing program of study provide sufficient coverage on the topic of patient safety? 1) Yes 2) No

Created for the University of Missouri-Columbia School of Medicine, 2004
Permission to use these adapted materials is granted with acknowledgement

Comments:

Demographic Information:

Name of university or college: _____

Program: _____ Associate degree

_____ RN-to-BSN

_____ Accelerated (A program in which the students have already obtained a bachelor's degree in a field other than nursing and are pursuing a bachelor's degree in nursing).

_____ Traditional (A program in which the students are pursuing a bachelor's degree in nursing without prior credentialing as a Registered Nurse).

Age: _____

Gender: _____ Female

_____ Male

Race/Ethnicity:

_____ African American

_____ Asian American

_____ Caucasian

_____ Hispanic

_____ Native American

_____ Other

Appendix G

Institutional Liaison Guidelines (Phase II and Phase III)

Institutional Liaison Guidelines (Phase II and Phase III)

1/29/07

TO: College/School of Nursing Institutional Liaison

FROM: Teri Chenot
Doctoral Candidate/Principal Investigator
University of North Florida

Listed below is a guideline for the survey and curriculum request:

_____ 1. Box received with cover letters, surveys, and stamped box for return to Principal Investigator.

_____ 2. Distribute cover letters and surveys to the nursing students in their last term in the classroom at the end of the class.

_____ 3. Read the cover letter to the nursing students and request that the surveys be returned to the box in the classroom at the end of that class.

_____ 4. Institutional liaison should wait outside the classroom until all surveys have been submitted to box.

_____ 5. College/School of Nursing's curriculum should be added to the box along with the surveys (please note nursing program on curriculum if college/school of nursing has more than one nursing program).

_____ 6. Sign this form and add to the box.

_____ 7. Seal box and return to the Principal Investigator.

Date: _____
College/School of Nursing: _____
Name (Print): _____
Name (Signature): _____
Institutional liaison's signature on form indicates compliance to the guideline for the surveys and curriculum.

Appendix H

Request for Access (Phase II and Phase III)

Request for Access (Phase II and Phase III)

1/29/07

Dear Nursing Student:

I would very much appreciate your participation in a study as the second phase for my doctoral dissertation at the University of North Florida. Participation in the study is voluntary. The purpose of the second phase is to assess nursing students' knowledge, skills, and attitudes about patient safety. I am requesting that you allow me to use 15 minutes of your time to collect data for this study. A copy of the patient safety assessment survey will be provided to you from the faculty member at your university or college of nursing program.

Your participation in this study is completely voluntary. Your confidentiality will be protected, as no names, social security numbers or any other information that could reveal the identity of the nursing students that participate in the study will be published and only aggregate data will be reported. All research materials will be kept in a secured file.

If you are willing to participate then please complete the patient safety assessment survey according to the instructions on that document and return to the nursing faculty member. Completion and return of the attached survey shall serve as your consent to participate in the research study. Please feel free to contact me with any questions at (904) 998-0707. Thank you very much for your consideration and for your participation in this study.

Please contact Dr. Kathaleen Bloom, Chair, UNF Institutional Review Board, (904) 620-2684 for any questions about your rights as a research participant.

Sincerely,

Teri M. Chenot, M.S., M.Ed., R.N.
Doctoral Candidate -
University of North Florida

Appendix I

UNF Institutional Review Board Approval (Phase II and Phase III)

UNF IRB Exempt Approval #07-013 (Phase II and Phase III)

UNF
UNIVERSITY *of*
NORTH FLORIDA.

Office of Research and Sponsored Programs
4567 St. Johns Bluff Road South
Jacksonville, FL 32224-2665
904-620-2455 FAX 904-620-2457
Equal Opportunity/Equal Access/Affirmative Action Institution

MEMORANDUM

DATE: February 9, 2007

TO: Theresa Maria Chenot

VIA: Dr. Larry Daniel,
Counseling and Educational Leadership

FROM: Dr. Kathaleen Bloom, Chair,
UNF Institutional Review Board

RE: Review by the UNF Institutional Review Board IRB#07-013:
"Frameworks for Patient Safety in the Nursing Curriculum"

This is to advise you that your project, "Frameworks for Patient Safety in the Nursing Curriculum," has been reviewed on behalf of the UNF Institutional Review Board and has been declared exempt from further IRB review.

This approval applies to your project in the form and content as submitted to the IRB for review. Any variations or modifications to the approved protocol and/or informed consent forms as they relate to dealing with human subjects must be cleared with the IRB prior to implementing such changes.

Should you have any questions regarding your project or any other IRB issues, please contact Nicole Sayers, Coordinator of Research Compliance, at 620-2498.

Thank you.

Appendix J

Phase III—Nursing Program Curriculum

Phase III - Nursing Program Curriculum

School	Program	Patient Safety Content	Instructional Methodologies	Documents Reviewed
A	ADN	Informatics; Communication Collaborative care; Infection control; Falls; Environmental safety; Acceptable abbreviations; Incident reports; 5-rights in medication administration; Domestic violence; Health history/lab findings; Performance/Peer Review; Healthcare Agency Orientation (Quality/Risk)	Text; Lecture; Discussion; Film; Nursing skills lab; Healthcare agency; Critical thinking skills; Internet; Media; Guest speaker; Journal articles	Department of Nursing: Generic Module Packet (Course Outlines); Healthcare Agency Non-Employee and Volunteer General Orientation Handbook
B	Accelerated Traditional *RN-to-BSN – collapsed into Traditional data due to low sample number	Pharmacology; Falls; Lab data; Safety concerns	Lecture; Discussion; Case studies; Safety Competencies—environment, falls, infection control; lifting, transferring patients; Readings; Quizzes; Scholarly writing; Interactive activities; Online discussions; Dosage calculations test	Syllabi
C	Traditional	CPR and preventive techniques; Collaboration	Research findings;	Website; School of

			Collaborate; Promote quality healthcare; Critical thinking	Nursing Program; Under-graduate Catalog
D	Traditional	Risk Management; Health Outcomes; Laboratory Interventions/outcomes; Quality Outcomes; Environmental Safety; Communicable Disease; Collaboration; Managing Quality and Performance; Violence; Groups at Risk	Lab; Clinical experiences	School of Nursing Generic Course Plan; Under-graduate Catalog
E	ADN	Regulatory boundaries; Communication skills; Data collection; Collaboration; Positive Patient Outcome	Critical thinking; Evidence-based practice; Clinical Competence; Dosage Calculation test;	Website; Department of Nursing Information Packet
F	Accelerated Traditional	Pharmacologic management; Lab findings; Risk reduction	Lab experience; Library Databases; Research; Clinical Practicum	Website; School of Nursing Curriculum
G	ADN	Promotion of Health and Safety; Reporting abuse/neglect	Critical thinking; Interpersonal Communication; Core Performance Standards	Website; Online R.N. Advanced Standing Degree; Department of Nursing

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Vita
Theresa Maria Chenot

Educational and Professional Experience

Academic Degrees

Master of Science in Nursing (in progress), Florida Atlantic University.
- Anticipated Graduation Date: December 2008.

Bachelor of Science in Nursing, Florida Atlantic University (2007).

Doctor of Education (in progress), University of North Florida.
Educational Leadership, cognate in Adult Learning/Patient Safety.
- Coursework completed with 3.99 GPA.
- Dissertation Defense: September 2007.
- Anticipated Graduation Date: December 2007.

Master of Education in Secondary Education, University of North Florida (2004).

Master of Science in Marriage and Family Therapy, St. Thomas University (1991).

Bachelor of Health Services in Health Administration, Florida Atlantic University (1984).

Associate of Science in Nursing, Broward Community College (1981).

Professional Experience

Nemours Children's Clinic – Jacksonville, FL. (2006 – Present)
- Quality/Outcomes Specialist

Florida Community College at Jacksonville, FL. (2004 – 2006)
- Instructional Program Manager – Nursing Related Programs

Shands Medical Center, Jacksonville, FL (2001 – 2004)
- Patient Safety Officer
- Nurse Clinician – Women's Services
- Nurse Recruiter

Pavilion Center for Women, Jacksonville, FL (1998 – 2000)
- C.E.O.

St. Luke's Hospital/Mayo Clinic, Jacksonville, FL (1996 – 1998)
- Education Specialist – Maternal/Child Services

Department of Health (Duval County), Jacksonville, FL (1995 – 1996)
- Nursing Program Specialist – Childhood Lead Poisoning Prevention Program

Boca Raton Community Hospital, Boca Raton, FL (1989 – 1995)
- Maternal/Child Program Coordinator
- Women's Services Outreach Coordinator

Certifications

Registered Nurse

Publications/Presentations

2007 Chenot, T. (2007). Patient safety in the ambulatory care setting. *Northeast Florida Medicine, 58*(3), 21-26.

2006 Chenot, T. (2006, April). *Quality, patient safety, and the healthcare curriculum.* Presentation at the 17th International Conference on Teaching and Learning, Florida Community College, Ponte Vedra Beach, FL.

2006 Chenot, T. (2006, February). *Testing of group differences with multivariate and multivariate analytic procedures: Issues and comparisons.* Paper presented at the 29th Annual Meeting of the Southwest Educational Research Association, Austin, TX.

2004 Chenot, T. (2004, August). *Take it to the top: A perspective on healthcare leadership and patient safety.* Presentation at the meeting of the Northeast Florida Association of Healthcare Quality, Jacksonville, FL.

2004 Chenot, T. (2004, February). *The education of healthcare leadership on patient safety and its impact on improving patient outcomes.* Paper presented at the 27th Annual Meeting of the Southwest Educational Research Association Dallas, TX.

Awards

Exceptional Service Award, Florida Community College, 2005.

Place of Birth

Cincinnati, Ohio