The Impact of a Clinical Safety Educational Strategy on Undergraduate Baccalaureate Nursing Students’ Knowledge, Skills, and Attitudes About Patient Safety and Systems Thinking

By

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Abstract

Professional nurses are expected to deliver high quality, safe nursing care, yet a qualified and competent nurse begins prior to becoming a licensed professional nurse. Healthcare professionals in academic settings continually strive to educate safe practitioners. The goal to enhance quality and safety in nursing education is emphasized in the Quality and Safety Education for Nurses (QSEN) national initiative. Recognizing the significance that professional nurses play in delivering safe patient care, QSEN nursing leaders and pedagogical experts identified quality and safety competencies to integrate in pre-licensure nursing programs to prepare future nurses with the knowledge, skills and attitudes.

A descriptive pretest-posttest design was used to determine the effect of an on-campus clinical safety educational strategy on undergraduate baccalaureate nursing students’ safety knowledge, skills, attitudes, and systems thinking. This study sought to answer the following research question: Do baccalaureate-nursing students’ patient safety knowledge, skills, attitudes, and systems thinking differ after participating in an on-campus clinical safety educational strategy? The sample of 47 sophomore and 37 junior baccalaureate nursing students attending a small liberal arts college in the state of Pennsylvania engaged in a four hour intervention which included didactic and experiential activities related to patient safety and systems thinking.

The primary purpose of the on-campus clinical safety educational strategy (OCSES) was for students to recognize knowledge, skills and attitudes and use of
systems thinking as a means for quality improvement within the context of the QSEN competency, patient safety. The study revealed no statistical significance in students’ patient safety knowledge or attitudes. On average, participants did not increase patient safety knowledge from pretest (M= 4.4, SD = 1.12) to posttest (M= 4.3, SD= 1.11), t(1.28) p = .20). Patient safety attitudes did not show statistical significance from pretest (M= 3.6, SD = .22) to posttest (M= 3.6, SD=.29), t(1.07) p = .28). Statistical significance occurred with students’ patient safety skills. A paired samples t-test revealed statistical significance from pretest (M= 3.2, SD = .80) to posttest (M= 3.7, SD=.69), t(-6.20) p = .000. Statistical significance was also noted with students’ systems thinking from pretest (M= 60.0, SD = 9.86) to posttest (M= 65.6, SD=11.02), t(-4.65) p = .000. This study suggests that integrating safety concepts into the undergraduate curriculum has the potential to improve future practitioners’ safety skills and systems thinking.
Dedicated To:

This scholarly work is dedicated to my husband, my sons, my parents, my friends, and my family for their unwavering love, support and encouragement over the years.
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Over the past five years, I have received the support and encouragement from a number of individuals. I would never have been able to finish my doctoral studies and scholarly project without the guidance and support from my committee members, support from my colleagues, my friends, and my family. You are all a blessing from God.

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I end with one of my favorite quotes, “Nothing great in the world has been accomplished without passion.” Georg Wilhelm Friedrich Hegel. To all of you—live your lives passionately. Now let’s go and have some fun!
LIST OF TABLES

Table 1. Measures of Safety Knowledge, Skills, and Attitudes and Systems

Thinking..............................................................................................................41

Table 2. Demographic Data.................................................................................55

Table 3. Patient Safety: Knowledge, Skills, and Attitudes Table......................57

Table 4. Systems Thinking Scale Table...............................................................57
LIST OF FIGURES

Figure 1. Study Model........................................................................................................13
Chapter One

Introduction

The Institute of Medicine’s (IOM) 1999 published report, *To Err is Human*, indicated that medical errors committed by healthcare providers are alarmingly high. Upwards of 98,000 people die in the United States each year as a result of harm from healthcare that is supposed to improve health (IOM). “Many more people die from medical errors in a year than from highway accidents, breast cancer, or AIDS” (Sammer, Lykens, Singh, Mains, & Lackan, 2010, p. 156).

curricula and clinical learning experiences based on the five competency areas
(Brady, 2011; Finkelman & Kenner, 2012; Greiner & Knebel, 2003). Five core
competencies: patient-centered care, interdisciplinary teams, evidence-based practice,
quality improvement (and safety), and informatics provide the groundwork to
improve the health professions education as it relates to quality and safety (Barton,
Armstrong, Preheim, Gelmon, & Andrus, 2009; IOM, 2003; Sherwood &
Barnsteiner, 2012). The IOM findings on patient safety and errors have made quality
and safety a vital concern in healthcare and nursing education.

In response to the IOM findings, nursing addressed critical quality and safety
issues within healthcare environments. Finkelman and Kenner (2012) noted that
having qualified and competent staff to improve healthcare begins prior to becoming
a licensed professional nurse. The authors suggested that in order to become
competent professionals, students should be able to answer questions such as: What
types of errors occur? What methods are used to analyze errors to prevent further
errors? How does a nurse affect patient safety? Nurse educators are faced with
examining approaches to improve educational curricula and address the students’
understanding of their critical role to ensure patient safety. There is a gap in the
literature that evaluates the effect of a safety education intervention on baccalaureate
nursing students’ safety knowledge, skills and attitudes, and systems thinking.
Therefore, the purpose of this study was to determine the effect of a safety
educational strategy on these outcomes.
Background

Healthcare professionals, national nurse leaders, and nursing organizations support the delivery of high-quality patient care and the exploration of pedagogical approaches to enhance quality and safety (Chenot & Daniel, 2010). The American Association of Colleges of Nursing (AACN), a national nursing organization dedicated to the advancement of baccalaureate and graduate nursing education, guides professional nursing education and practice (AACN, 2013). A Task Force of the AACN led the charge to examine the Essentials of Baccalaureate Education for Professional Nursing Practice to include exemplars of quality and safety competencies (AACN, 2008). Using the exemplars as guideposts, nursing faculty recognized the significance of executing a comprehensive quality and safety curricula, and the need to provide learning experiences about quality improvement approaches (Finkelman & Kenner, 2012).

Quality and Safety Education for Nurses

Enhancing quality and safety in nursing education is emphasized in the Quality and Safety Education for Nurses (QSEN) national initiative. Nursing leaders and pedagogical experts have recognized the importance of professional nurses providing high quality, safe patient care through individual performance and system effectiveness, yet little is known about students’ knowledge of patient safety and systems thinking. The QSEN experts developed six competency domains to provide a framework for nursing education. The six quality and safety competency domains originally derived from the IOM include: patient-centered care, teamwork and
collaboration, evidence-based practice, quality improvement, safety, and informatics (QSENa, 2013). Within each competency domain, knowledge, skills, and attitudes are the foundation to ensure future nurses are prepared to provide high quality safe nursing care.

**Systems Thinking**

Systems thinking is an approach to assist healthcare professionals to improve patient safety (Dolansky & Moore, 2013; Schyve, 2005). Nursing practice has long viewed patient safety through a narrow lens of avoiding medication errors and preventing patient falls (Shortell & Singer, 2008), with causes for errors identified at both system and practice level (Benner et al., 2002). Chenot and Daniel (2010) noted that the current emphasis in pre-licensure nursing curriculum is on personal responsibility to master knowledge and skills to ensure patient safety. While having students acknowledge personal responsibility is essential, systems thinking enables new and productive system approaches to ensure patient safety (Day & Smith, 2007; Longo, Hewett, Ge, & Schubert, 2005; Schyve, 2005).

There is paucity in the literature examining patient safety educational interventions with undergraduate nursing students. Minimal evidence exists to demonstrate the importance of evaluating patient safety in undergraduate nursing curriculum (Chenot & Daniel, 2010; Duhn et al., 2012; Miller & LaFramboise, 2009; Vaismoradi, Salsali, & Marck, 2011). The literature indicates several instruments available to measure clinicians’ patient safety and knowledge, skills, and attitudes (Chenot & Daniel, 2010; Madigosky, Headrick, Nelson, Cox, & Anderson, 2006;
Schnall, Stone, & Currie, 2008). Other instruments are available to measure health professions’ perceptions of patient safety competence at entry into practice (Ginsburg, Castel, Tregunno, & Norton, 2012) while further instruments measure quality and safety knowledge, skills, and attitudes of experienced nurses (Dycus & McKeon, 2009). Although instruments are available in research to study patient safety in nursing practice and in health professional educational programs, there is limited literature reporting the use of instruments to examine undergraduate nursing students’ patient safety knowledge, skills, attitudes, and systems thinking.

Few research studies examined patient safety knowledge, skills, and attitudes with undergraduate nursing students. One study conducted on patient safety education in nursing program curricula examined pre-licensure programs’ support to integrate QSEN initiatives (Chenot & Daniel, 2010). Additionally, these authors examined senior level nursing students’ perceptions regarding student awareness of patient safety knowledge, skills, and attitudes. Chenot and Daniel (2010) recommend empirical research to build on the findings from their first study conducted with nursing students. A second study reported by Vaismoradi, Salsali, and Marck (2011) explored knowledge, skills, and attitudes about patient safety among Iranian undergraduate nursing students. The authors suggest that nurse educators design curricular strategies to go beyond the conceptual level of patient safety to bridge the link between theoretical principles of patient safety and clinical application. A third study conducted by Miller and LaFramboise (2009) contends that senior baccalaureate nursing students in the United States are challenged to understand
knowledge, skills, and attitudes about patient safety and systems thinking. Miller and LaFramboise propose that both didactic and focused clinical activities have the greatest impact on students’ knowledge, skills, and attitudes related to patient safety and quality. While Miller and LaFramboise (2009) suggested integrating didactic and focused clinical strategies with baccalaureate nursing students, other researchers suggested the importance of consistently engaging students in safety principles throughout the four-year nursing program.

Duhn et al. (2012) supported Miller and LaFramboise’s (2009) contention to provide both classroom and clinical patient safety educational approaches throughout the entire undergraduate nursing program. Duhn et al. (2007) evaluated first, second, third, and fourth year undergraduate Canadian nursing students and propose that future studies be conducted to evaluate the effectiveness of patient safety strategies over an entire program. Research by Abbot, Fuji, Galt, and Paschal (2012) investigated an inter-professional patient safety course for baccalaureate nursing students. The authors established that students expressed positive attitudes about the value of the course to their own professional development while gaining knowledge about using a systems approach to improving patient safety. Lastly, the literature provided evidence to support the importance of quality and safety education with post baccalaureate nursing students (Ardizzone, Enlow, Evanina, Schnall, & Currie, 2009; Currie et al., 2009; Miltner & Patrician, 2012). These studies add to the body of knowledge on patient safety in nursing; however, there is a gap in the literature that
examines the effect of patient safety educational interventions with undergraduate nursing students.

While there is paucity in the nursing literature that examined patient safety educational interventions in undergraduate nursing students, several studies conducted within other health professional programs support patient safety. Several studies found in the literature related to health professional students' patient safety knowledge, skills, attitudes, and systems thinking after participation in curriculum dedicated to patient safety (Aboumatar et al., 2012; Jansma, Wagner, Kate, & Bijnen, 2011; Madigosky et al., 2006). A study conducted by Madigosky et al. (2006) evaluated medical students' patient safety knowledge, skills, and attitudes after participation in a patient safety curriculum and again at one-year to affirm the effects and value of the curriculum. Jansma et al. (2011) found positive changes in medical residents' knowledge, skills, and systems attitudes after completion of a patient-safety education course. Lastly, Aboumatar et al. (2012) reported knowledge, systems thinking, and self-efficacy scores increased among medical students after participation in curricula dedicated to patient safety. Recommendations from these studies include the need to offer and evaluate curricula in other healthcare professional programs such as nursing. While the medical field has engaged in research to evaluate patient safety, it is critical that nurse educators take the lead and design nursing curricula to address the QSEN patient safety competency. Additionally, nurse educators have a vital role in developing patient safety knowledge, skills, attitudes, and systems thinking among nursing students. Gaps in
the literature currently exist to examine the effectiveness of patient safety interventions in undergraduate nursing programs. Nurse educators are charged with the responsibility to prepare professional nurses to deliver high quality, safe patient care. To accomplish this goal, additional empirical evidence is required to address the gap in the literature.

**Problem Statement**

A paradox exists in the nursing education field. VanGeest and Commins (2003) suggest that nurses in practice identify patient safety as an important concern in health care. They contend that a comprehensive nursing curriculum is essential to teach patient safety to ensure quality care. Dolansky, Singh, and Neuhauser (2009) support Finkleman and Kenner's (2012) position to challenge nursing schools to move safety and quality improvement from the background to the foreground in all parts of nursing curricula. There is paucity in the nursing literature that evaluates educational interventions to improve patient safety knowledge, skills, attitudes, and systems thinking in nursing curricula; therefore, this investigator evaluated the effectiveness of an on-campus clinical safety educational strategy with undergraduate baccalaureate nursing students.

**On-Campus Clinical Safety Educational Strategy**

The implementation of an on-campus clinical experience consisted of a creative teaching-learning strategy for undergraduate nursing students to draw attention to quality and safety competencies. The on-campus clinical experience included a safety educational strategy, herein referred to as on-campus clinical safety
educational strategy (OCSES). The primary purpose of the OCSES was for students to recognize knowledge, skills, and attitudes, and the use of systems thinking as a means for quality improvement within the context of the QSEN patient safety competency. Four major objectives for the OCSES that mirror the QSEN patient safety competency for patient safety were:

- Identify various methods that ensure recognition of patient safety risks.
- Demonstrate effective communication techniques when disclosing an error.
- Articulate awareness of strategies to mitigate harm through a systems approach.
- Apply quality improvement tools for process and system improvement.

To achieve the goals of the OCSES, the investigator bridged the link between patient safety and quality improvement processes. Historically, education about quality and safety focused on the knowledge, skill, and vigilance of individual practitioners (Mitner, Dawson, Patrician, & Jukkala, 2012). A shift occurred partly in response to the IOM’s *Health Professions Education, A Bridge to Quality* (2003) report and QSEN’s focus on quality improvement as a core competency for nursing students. Quality improvement is an inherent element in the QSEN patient safety competency and was addressed in the OCSES activities.

**Purpose of Study**

This study was conducted for the purpose of determining the effect of an on-campus clinical safety educational strategy on undergraduate baccalaureate nursing
students’ patient safety knowledge, skills, attitudes, and systems thinking in a baccalaureate nursing program in the Mid-Atlantic region of the United States.

**Research Questions**

Using a descriptive, pretest-posttest design, this study sought to answer the following overarching question: Do baccalaureate-nursing students’ patient safety knowledge, skills, attitudes, and systems thinking change after participating in an on-campus clinical safety educational strategy (OCSES)? Four research questions (RQ) were explored:

(RQ1) Is there a change in baccalaureate nursing students’ Healthcare Professionals Patient Safety Assessment Curriculum Survey (HPPSACS-A) safety knowledge scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?

(RQ 2) Is there a change in baccalaureate nursing students’ HPPSACS-A safety skills scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?

(RQ 3) Is there a change in baccalaureate nursing students’ HPPSACS-A safety attitude scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?

(RQ 4) Is there a change in baccalaureate nursing students’ systems thinking scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?
Theory Guiding the Study

Lev Vygotsky’s social developmental theory guided the intervention of the study (Utley, 2011; Vygotsky, 1978). Vygotsky’s social developmental theory, grounded in social cognitivism and social constructivism, emphasizes that learning takes place in social interactions with meaningful and clearly defined activities under the guidance of knowledgeable peers and faculty (Bastable, 2008; Darity, 2008; Swayne, 2005; Utley, 2011). Vygotsky’s theory, created to explain child development and learning (Chen, Feng, & Chiou, 2009; Gredler, 2005), is a relevant theory for nursing education (Bastable, 2008; Brandon & All, 2010; Sanders & Welk, 2005).

Vygotsky proposes two fundamental concepts of cognitive development: the zone of proximal development (ZPD) (Gredler, 2005; Louis 2009) and scaffolding (Chen et al., 2009; Louis, 2009; Wink & Putney, 2002). The zone of proximal development describes the range of task difficulty that is too complex for the learner to complete alone, but can be successfully completed with the assistance of someone more knowledgeable (Louis, 2009). Vygotsky contends that when a student is in the ZPD, providing the student with the appropriate guidance will assist the student to achieve the task. Scaffolding of new information occurs as students’ achieve the learning objectives during social interaction with knowledgeable teachers and peers (Chen et al., 2009; Gredler, 2005; Sanders & Welk, 2005; Wink & Putney, 2002). Communication and cognition are central to knowledge acquisition with both the
teacher and students actively engaged in the learning activity (Chen et al., 2009; Sanders & Welk, 2005).

Vygotsky’s theory guided the intervention of the study as students were purposefully put in groups to interact with peers and faculty. The intervention enhanced students’ acquisition of knowledge, skills and attitudes about patient safety, and systems thinking in nursing practice as the students’ learn new information too challenging for the student to successfully learn on their own. The intervention provided students the opportunity to build upon nursing knowledge of patient safety with nursing faculty and peer interactions.

Louis (2009) contends teachers can design classrooms and activities to foster cognitive development. The educational strategy used in this study facilitated cognitive development among the students. The educational intervention was developed to include sophomore and junior nursing students during an on-campus clinical experience with different levels of nursing knowledge. Sophomore students were at near completion of their first semester of a clinical nursing course. Junior students were at near completion of a third clinical nursing course. While not all students were exposed to the exact same clinical experiences, they all participated in prior clinical activities involving safe patient care. The educational intervention was developed to include scaffolding. Scaffolding was ensured with interactions with knowledgeable faculty and peers.
The study model is presented below.

![Study Model Diagram]

*Figure 1*. Study Model. The study model illustrates the concepts represented in the study: patient safety, knowledge, skills, attitudes, and systems thinking.

The concepts of the study model are patient safety knowledge, skills, attitudes, and systems thinking. In Figure 1 above, the circle on the left represents the concepts of the study: patient safety knowledge, skills, attitudes, and systems thinking prior to the educational intervention. The square represents the OCSES to be implemented with undergraduate baccalaureate-nursing students that incorporates the components of Vygotsky’s social developmental theory. The circle on the right represents the outcome variables of the study: patient safety knowledge, skills, attitudes, and systems thinking. The empirical indicators are represented in the rectangles below each circle as pretest and posttest. The HPPSACS-A and Systems Thinking Scale were used to measure the concepts in the study. The rectangle above the OCSES
represents scaffolding of new learning of patient safety knowledge with peers or experienced faculty.

Definitions of Terms

The following section defines key terms used throughout this study.

Knowledge. Knowledge is conceptualized as “information or skills acquired through experience or education” (Knowledge, 2013). Individuals learn based on organizing information received and the relevance of the information to the learner (Taylor et al., 2008). Suskie’s (2009) definition of knowledge from a student learning perspective encompasses “remembering, replicating a simple procedure, and defining, summarizing and explaining concepts or phenomena” (p. 118). For this study, knowledge was defined as the remembering of facts related to patient safety.

Skills. Merriam-Webster’s online dictionary (2013) defines the concept of skills as “the ability to use one’s knowledge effectively and readily in execution or performance.” For this current study, skills was defined as the comfort level with completing an incident report, analyzing causes of an error, and disclosing an error to another health professional.

Attitudes. As defined by The Free Dictionary (2013), “attitudes reflect a tendency to classify objects and events and to react to them with some consistency. Attitudes are not directly observable but rather are inferred from the objective, evaluative responses a person makes.” For this study, attitudes corresponded to agreement with the inevitability of making errors in healthcare that lead to patient harm and the reactions and responses to errors and patient safety.
Systems thinking. The theoretical definition of systems thinking according to Dolansky, et al. (2010) is:

The ability to recognize, understand, and synthesize the interactions and interdependencies in a set of components designed for a specific purpose. This includes the ability to recognize patterns and repetitions in the interactions and an understanding of how actions and components can reinforce or counteract each other. These relationships and patterns occur at different dimensions: temporal, spatial, social, technical or cultural. It is fundamental to understand specific methodology or strategies to explore and redesign a set of components comprising a whole. (p. 5)

For this study, systems thinking was defined as the ability to analyze interrelated and interdependent events and potential causes for a medication error using a fishbone diagram.

Significance to Nursing

Patient safety is expected and valued in professional nursing practice. While the literature substantiates the need for patient safety in delivery of high-quality patient care, educators are challenged to improve nursing curricula to address students’ understanding of their critical role to ensure patient safety before becoming a licensed professional nurse. This study is significant to nursing practice, nursing education, and patient care outcomes. The study meets the needs of the IOM’s third report, Health Professions Education: A Bridge to Quality (2003), and addresses quality and safety content in the patient safety QSEN competency. Furthermore, the
proposed study addresses the gap in the literature to bridge the link between nursing practice and quality improvement processes. The literature supports development and implementation of creative patient safety educational strategies in nursing curricula; however, as noted in the Chapter Two Literature Review, little is known about how an educational patient safety strategy will impact knowledge, skills, attitudes, and systems thinking of baccalaureate nursing students.
Chapter Two

Literature Review

Introduction

Professional nurses are expected to deliver high quality safe nursing care (Cronenwett et al., 2007). Nurse educators are challenged to improve nursing curricula to address students understanding of their critical role to ensure patient safety in their professional practice. Furthermore, nurse educators are charged to develop and evaluate curricula and teaching strategies on patient safety knowledge, skills, attitudes, and systems thinking to prepare future nurses to provide high quality safe nursing care. The review of the literature examined nursing and medical education patient safety research.

The investigator conducted a search of electronic databases Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Academic Search Premier, delimited to the years 2005-2013. Key words used in the search were patient safety and nursing education, which yielded 4,371 articles. The Cochrane Library and Johanna Briggs did not yield any articles with the same words. Further refinement of the CINAHL search included the words research, baccalaureate nursing students, knowledge, skills, and attitudes yielded an additional 42 articles.

The second search was broadened to encompass patient safety, medical students, research, knowledge, skills and attitudes, which yielded 200 articles. A
final search was conducted using the electronic database in CINAHL, and the
Academic Search Premier for the phrase “systems thinking,” which yielded a limited
number of articles. This literature review examined nursing and medical education
patient safety research.

Institute of Medicine

Since 1999, the Institute of Medicine (IOM) has published numerous, major
reports that focused on quality care and safety (Finkelman & Kenner, 2009), three of
which were relevant to this study. The landmark IOM report, *To Err Is Human:*
*Building a Safer Health System* (1999), influenced the public’s view of healthcare and
described that errors are caused by faulty systems processes and conditions, and set
the stage for healthcare professionals to make mistakes or fail to prevent them
(Finkelman & Kenner, 2012; IOM 1999; Leape et al., 2009). The key to patient
safety rests in understanding why errors occur and systematically redesigning
processes to eliminate the potential for errors (Chenot, 2007).

The second IOM report (2003) significant to the study, *Health Professions
Education, A Bridge to Quality*, centered on the need to have qualified healthcare
professionals improve healthcare, and concluded that all health professions education
should change to meet the growing demands of current and future healthcare systems
(Finkelman & Kenner, 2012). The report proposed that educators of healthcare
professionals focus on enhancing quality and safety to meet the needs of the dynamic
and complex healthcare system. Finkelman and Kenner (2012) noted that the report
was highly significant specifically for nursing education because it proposed that
accrediting, licensing, and certification bodies agree on a set of core competencies into their oversight processes. The five core competencies identified were (a) provide patient-centered care, (b) work in interdisciplinary teams, (c) use evidence-based practice, (d) apply quality improvement, and (e) use informatics (Barton et al., 2009; IOM, 2003; Sherwood & Barnsteiner, 2012). Challenged by the 2003 IOM Health Professions Education Report, accrediting bodies and nursing faculty set out to transform educational programs. Finkelman and Kenner (2012) explained the primary goal is to prepare future nurses with knowledge, skills, and attitudes to become active participants to continually address patient safety.

**Quality and Safety Education for Nurses**

Recognizing the significance that professional nurses play in delivering safe patient care, a group of nurse experts began a project to prepare future nurses. This national initiative, the Quality and Safety Education for Nurses (QSEN) project, which was financially supported by the Robert Wood Johnson Foundation in 2005, prepares future nurses with knowledge, skills, and attitudes required to deliver high-quality and safe patient care (QSENb, 2013). Using IOM's five core competencies as a foundation, QSEN defined and added patient safety to supplement the six quality and safety competencies.

Over the ensuing years from 2005 to present, the QSEN team of experts led initiatives in three distinct phases dedicated to improving quality and safety in undergraduate nursing education (Sherwood & Barnsteiner, 2012). Phase I of the QSEN initiative culminated in defining knowledge, skills, and attitudes as a
framework for six competencies in pre-licensure nursing education: patient-centered care, teamwork and collaboration, evidenced-based practice, quality improvement, safety, and informatics (Sherwood & Barnsteiner, 2012).

Phase II (2007-2008), a 15-month learning collaborative with nursing faculty from 15 pilot pre-licensure schools included diploma, associate degree, and baccalaureate degree programs endeavored to enhance teaching of quality and safety concepts in nursing education. Cronenwett, Sherwood, and Gelmon (2009) explained that this phase resulted in the integration of the six competencies in the programs’ curricula to enhance teaching of quality and safety concepts in nursing education.

Additionally during Phase II, Barton, Armstrong, Preheim, Gelmon, and Andrus (2009) surveyed 12 QSEN core faculty, two QSEN Advisory Committee members, and 15 QSEN pilot school project directors. The survey findings resulted in the development of a curriculum map that revealed how knowledge, skills, and attitudes for each QSEN competency was introduced and threaded throughout program curricula. Phase III (2008-2012) promoted continued innovation and assessment of student learning knowledge, skills, and attitudes of the six QSEN competencies, development of faculty expertise to teach the six competencies, and sustainability of QSEN initiatives in textbooks, accreditation, certification and licensure exams (Sherwood & Barnsteiner, 2012).

Numerous authors and accrediting agencies clearly stated that it was the primary responsibility of nursing programs to prepare its graduates to deliver high
quality safe care (AACN, 2013; Chenot & Daniel, 2010; Sullivan, Hirst, & Cronenwett, 2009). Smith, Cronenwett, and Sherwood (2007) conducted a descriptive study involving approximately 200 Bachelor of Science in Nursing and Associate Degree nursing programs. The majority (95%) of respondents' reported their program threaded content related to QSENs quality and safety competencies throughout the curriculum. The authors identified that quality improvement and informatics were the two least likely quality and safety competencies to be threaded; whereas, patient-centered care and safety were most often included.

**Patient Safety and Nursing Education Curricula Design**

There is no one way for pedagogical experts to integrate the QSEN competencies of patient-centered care, quality improvement, evidence-based practice, teamwork and collaboration, safety, and informatics in nursing curricula. National QSEN forums along with the QSEN website offer faculty a rich resource of current annotated bibliographies and peer-reviewed teaching strategies to incorporate safety and quality competencies in curricula. Embedding patient safety principles and the inherent quality improvement strategies along with systems thinking in the classroom, clinical, or simulation environments of pre-licensure nursing programs creates opportunities for students to develop critical thinking, to apply QSEN competencies, and deliver safe patient care to improve patient outcomes.

Few nursing programs dedicate entire program curricula to integrate QSEN competencies (Chenot & Daniel, 2010). A review of the literature suggests some nursing programs elect to focus on the QSEN patient safety competency within the
classroom and clinical environments (Duhn et al., 2012; Jones, 2013; Miller & LaFramboise, 2009). Other pedagogical experts value simulation strategies to address patient safety (Ironsie, Jeffries, & Martin, 2009; Piscotty, Grobbel, & Tzeng, 2011). Day and Smith (2007) suggest that faculty modify their thinking and approach to patient safety to include QSEN competencies in clinical experiences rather than change course content. While nurse educators value patient safety, there is limited literature that evaluates an educational strategy on patient safety with undergraduate nursing students.

Pedagogical experts contend that patient safety is imperative to integrate in nursing curricula (Cronenwett, Sherwin, & Gelman, 2009; Dolansky, Singh, & Neuhauser, 2009, Sherwood & Barnsteiner, 2012; Smith, Cronenwett, & Sherwood, 2007). Nursing students agreed with this contention; however, Vaismoradi, Salsali, and Marck (2011) discovered students expressed dissatisfaction with their patient safety curricula. The authors explored students’ perspectives of the curriculum in relation to their abilities to provide safe care. This qualitative descriptive study explored Iranian nursing students’ perspectives about patient safety and the role nursing education plays in making the connection between didactic and clinical experiences. The participants expressed dissatisfaction that emphasis was placed on pathophysiology, prognosis, and treatment rather than patient safety issues. Study participants stated that nursing instructors did not adequately prepare them to understand the link between theoretical principles of patient safety and clinical application. While Vaismoradi, Salsali, and Marck (2011) found students dissatisfied
with patient safety curricular content, other research suggested students’ interest in integration of patient safety competencies in the classroom and clinical environment may address student needs.

Duhn et al. (2012) conducted a quantitative cross-sectional study with Canadian baccalaureate nursing students. The sample included students in four levels of the baccalaureate program, and examined students’ perspective on integration of patient safety competencies in both classroom and clinical environments throughout undergraduate curricula. Students responded to a series of 11 questions using a 5-point Likert scale, where “1” was strongly disagree, and “5” was strongly agree. The students’ perspective of patient safety education overall within the curricula was statistically significant ($p < 0.01$). The highest level of student confidence was in hand hygiene, infection control, safe medication practice, and safe clinical practices.

Conversely, students reported feeling less confident in two specific areas. The first area was in recognizing, responding to, and disclosing adverse events. The second area was noted in the clinical setting where students reported less confidence in their attempt to apply didactic learning within the clinical setting. Furthermore, the authors found that the majority of students expressed that when an adverse event occurred, discussions centered on individual rather than systems approaches. Additional research suggests reluctance to report adverse events for fear of dismissal from the nursing program.

Reid-Searl, Moxham, and Happell (2010) contend that students’ reluctance to report errors rested on the fear of dismissal. The authors noted that when an error
was reported to the registered nurse supervising the student, an incident report was not always completed. Thus, students did not have an opportunity to engage in the cycle of quality improvement, for example, why the error occurred, prevention strategies, and implementation of corrective actions.

In this grounded theory study, the researchers interviewed 28 Australian, mostly female nursing students, ranging from 20-41 years. Approximately one-third of the participants shared that they made a medication error while on the clinical area. Many participants voiced feelings of panic and devastation. Some participants expressed receipt of positive support from the co-assigned registered nurse after an error of commission, yet other participants reported less support during actual or near miss medication errors. Conspicuously absent in this study was students’ articulation of their role in ensuring patient safety and responsibility to minimize patient harm. To address the critical need to include patient safety in nursing educational curricula and students’ desire to learn patient safety, nurse educators need to develop and evaluate pedagogical strategies on patient safety to enhance student learning, and to add to the body of empirical evidence.

There is one published study with multiple phases that specifically examined the effect of an educational intervention on the outcomes of patient safety knowledge, skills, and attitudes in undergraduate baccalaureate nursing curricula. Miller and LaFramboise (2009) conducted a mixed method quasi-experimental pilot study of a senior level baccalaureate program in the United States. The two-phase study focused on students’ perception of knowledge, skills, and attitudes related to patient
safety and quality. The control group consisted of 33 students who received no structured classroom content or clinical projects related to safety and quality, and did not participate in focus groups.

In phase one of the study, 32-intervention group students participated in quality and safety content via a case study approach integrated in the classroom. Within the case study, the competencies as defined by QSEN included patient-centered care, teamwork and collaboration, safety, and quality improvement. Intervention group 1 (n=24) received classroom content, only whereas intervention group 2 (n=8) received both classroom content and clinical projects. Intervention group 2 received specific safety and quality healthcare systems content in both classroom and clinical settings.

A second phase of the study included a focus group with both intervention groups. Three themes emerged from discussions with the intervention group 1 that received only classroom content. Participants had a tendency to blame other healthcare professionals and cited lack of communication and appropriate resource seeking for example from physical therapy or Internet resources. Somewhat different themes emerged from intervention group 2 when compared to intervention group 1, such as: safety, problem solving with a systems approach, and lack of communication. Miller and LaFramboise (2009) concluded that the greatest effect on students’ perception of knowledge, skills, and attitudes occurred when students experienced a combination of classroom and clinical learning activities.
In a second study, Chenot and Daniel (2010) reported on a study from Chenot’s dissertation (2007) exploring patient safety education for nursing students. The three-phase study examined nursing student awareness, skills, and attitudes about patient safety. Phase I pilot tested a 34-item instrument, Healthcare Professionals Patient Safety Assessment Curriculum Survey (HPPSACS). The HPPSACS instrument was an adapted version created by Madigosky, Headrick, Nelson, Cox, and Anderson (2006) for use with medical students. The HPPSACS instrument included multiple choice knowledge questions and Lickert-type scale questions to assess skills and attitudes (Chenot & Daniel, 2010). One hundred and fifty surveys from members of scholarly professional nursing organizations in the southeastern United States provided feedback to obtain supportive validity and reliability data on the HPPSACS survey. Exploratory factor analysis and alpha (α) reliability analysis were used to test validity and reliability on the HPPSACS.

Phase II research conducted in 2007 at seven community colleges and universities in southeastern United States examined 318 nursing students enrolled in their last term of study (associate or baccalaureate-accelerated, traditional, or RN-BSN program). For Phase II Chenot reviewed the HPPSACS instrument, and noted that five items related to knowledge were limited in scope, and subsequently deleted them from the survey. However, demographic items were added to the survey instrument to examine the relationship between demographic variables of race and ethnicity and nursing students’ perception of patient safety. At the end of Phase II,
Chenot and Daniel (2010) described subscales scores: comfort, error reporting, denial, and culture as a result of the study.

As reported in the Chenot and Daniel (2010) publication, a qualitative content analysis was conducted in Phase III. Patient safety curriculum and instructional methodologies of the seven participating schools were compared to the QSEN six core competencies patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics. This phase of the study examined patient safety and instructional methodologies such as experiential learning, discourse, critical thinking, and reflection (Chenot & Daniel, 2010). The authors explained that patient safety curriculum at one school included all six QSEN core competencies, whereas, all seven schools included at least three of the six QSEN core competencies.

Similar to Miller and LaFramboise (2009), a recent study conducted by Jones (2013) suggests that integration of classroom and clinical learning activities have the greatest effect on students’ patient safety awareness. Unlike Miller and LaFramboise’s work with students in an undergraduate baccalaureate program, Jones integrated the QSEN safety competency in associate degree-nursing curricula. The pilot study integrated the QSEN safety competency in the first five weeks in a fundamentals didactic course content followed by integration in clinical activities. The goal was to expose students to a culture of safety early in the course to improve learning. After receiving QSEN safety didactic instruction, 84 freshmen students then applied QSEN safety competency tools in clinical experiences. The 34-item
HPPSACS instrument reported by Chenot and Daniel (2010) was administered to
students as a pretest-posttest evaluation of students’ perception of safety awareness.
Jones (2013) contends a shift in patient safety awareness occurred with beginning
students when integrating QSEN safety teaching strategies in both didactic and
clinical instruction. In summary research in this area was limited, which allows nurse
educators to conduct studies that explores the integration of safety into nursing
curricula.

**Patient Safety and Medical Education Curricula Design**

As a result of the limited nursing research, the literature search was broadened
to examine patient safety in medical education. Although the medical field has
focused on patient safety curricular research since the 1999 IOM, *To Err is Human
Report*, three studies examined patient safety, knowledge, skills, and attitudes.
Madigosky et al. (2006) studied the effect of a patient safety curriculum with second
year medical students at the University of Missouri-Columbia School of Medicine.
The authors developed existing curriculum with a focus on medical student’s
knowledge, skills, and attitudes relevant to patient safety and medical fallibility. Five
themes addressed in the content included patient safety overview, error reporting,
system versus human approach, safety tools, and ethics/disclosure.

Fifty-three students completed a 28-item questionnaire to evaluate students’
knowledge, skills, and attitudes at three separate time frames, pre, post, and at one
year after the learning experience. Madigosky et al. (2006) reported a 95 %
confidence interval for paired differences assessed over time. The authors noted that
while second year medical students' participation in the program was well received and changes were reflected in the students' knowledge, skills, and attitudes over time, student self-reported behaviors suggested not all changes were sustained at one year. As a result of the study, Madigosky and the team of researchers recommended patient safety curricula to be addressed early on in medical academic curricula to achieve sustained results.

A second published study conducted by Jansma, Wagner, Kate, and Bijnen (2011) examined the effect of a patient safety course on medical residents' knowledge, skills, attitudes, intentions, and behaviors related to incident reporting. A controlled study occurred in two large teaching hospitals in the Netherlands. One hospital was used for the intervention where 44 residents attended the course. Residents working in the intervention hospital participated in a variety of learning activities to gain knowledge of patient safety and skills to recognize and cope with unintended events and unsafe situations. A total of 32 residents were used as external controls who did not participate in learning activities related to patient safety and skills.

The researchers developed a 17-item questionnaire using a 4-point Likert scale (strongly disagree/disagree/agree/strongly agree) to measure knowledge, skills, attitudes, intentions, and behavior of respondents. Data were collected from both intervention and control groups in three ways, before, immediately after, and at three months after the course. Additionally, incident reports completed by participants and hospital incident reporting systems were included in data analyses.
The researchers reported knowledge and self-reported skill scores of participants from the intervention group improved after participating in the course. Additionally, statistically significant positive changes in attitudes ($p < .05$) were reported with the intervention group after participation in the course vignettes at the three-month mark as opposed to attitudes of the control group. The authors' report of immediate and long-term positive effects of patient safety education for medical residents' knowledge, skills, and attitudes on incident reporting suggests there is value in integrating patient safety education in medical education.

A third study conducted by Abdi, Delgoshaei, Ravaghi, and Heyrani (2012) took a similar approach to patient safety education with medical students as Jansma et al. (2011). Final year medical students in specialty rotations-dermatology, pediatrics, otorhinolaryngology, surgery, obstetrics and gynecology, and emergency medicine participated in the study conducted at Rasoul Akram Medical Complex affiliated with the Tehran University of Medical Sciences. Iranian students exposed to their first medical error concepts participated in an evidenced-based course on patient safety and medical errors. The course was conducted over two sessions and consisted of two-hour lectures.

Education sessions included topics on patient safety and epidemiology of adverse events, medical errors and reporting systems, human approach versus system approach, and root cause analysis (RCA). Medical students completed a 24-item questionnaire based on Schnall et al. (2008) prior to and two months after course completion. One hundred and thirty-two pretests and 99 posttest questionnaires were
completed. Using paired *t*-test to compare means with a 95% confidence interval, the authors reported a statistically significant increase in knowledge scores \((p < .001)\) for all except one of the eight items. Medical student responses to eight out of 10 attitude items, and all three skills items showed statistically significant improvement from pre- to posttest. The authors reported a positive impact of patient safety curricula on medical students’ knowledge, skills, and attitudes, and contended there is a need for integration of patient safety education for medical students. Patient safety knowledge, skills, and attitudes is important to address; however, to mitigate adverse events within the dynamic nature of healthcare, healthcare professionals need to be educated to understand systems thinking.

**Systems Thinking**

Mitner, Patrician, Dawson, and Juukala (2012) noted that historically, education about quality and safety focused on the knowledge, skill, and vigilance of individual practitioners. A shift occurred partly in response to the *Institute of Medicine’s Health Professions Education, A Bridge to Quality Report* (2003). Schyve (2005) claimed that as recent as two decades ago, the healthcare system reacted to preventable patient harm as an anomaly and sought to blame and punish individual practitioners. Opportunities to review conditions in which an error occurred were hampered because focus centered on blame and punishment as opposed to understanding the context in which the error occurred, and the interconnectedness to other parts and individuals within a system. Mitner et al. (2012) claimed that as complexity in healthcare grew, applying conventional
approaches by putting the spotlight on individual practitioners becomes less effective. In the past decade a paradigm shift occurred within healthcare with the introduction of systems thinking (Dolansky & Moore, 2013; Schyve, 2005; World Health Organization [WHO], 2009).

While relatively new to healthcare, systems thinking has been prominent in other fields such as, engineering, manufacturing, and economics since the 20th century (WHO, 2009). As an approach to problem-solving, systems thinking views a problem as part of a wider, dynamic system. Using systems thinking when attempting to understand complex, interactive, interrelated, and interdependent processes can facilitate patient safety. Senge (1990) noted that systems thinking provides a framework for examining interrelationships. Senge also stated that systems thinking allows individuals to see patterns rather than snapshots. Kalim, Carson, and Cramp (2006) claimed that health professionals have rudimentary knowledge of systems thinking and its usefulness when tackling complex problems within the healthcare system.

Schyve (2005) suggested that systems thinking provides a less threatening platform to move beyond assigning blame. Rather, it offers opportunities to examine a combination of design and environmental failures while systematically reviewing how individuals, program structures, and processes may be contributing to errors and undermining patient safety. In healthcare, systems thinking has been introduced as a core approach within patient safety and quality improvement.
A panel of continuous quality improvement (CQI) experts Dolansky, et al. (2010) recognized the need to address systems thinking and CQI initiatives. These experts led a project, funded by the Robert Wood Johnson Foundation, to develop a valid and reliable measurement of systems thinking. The Systems Thinking Scale (STS) development and psychometric testing occurred over three phases from 2008-2010.

The outcome of Phase I of the STS included generation of instrument items and confirmation by a panel of 10 international CQI experts. Electronic mail focus groups offered opinions on how to develop a working definition of systems thinking, theoretical dimensions of systems thinking, and a preliminary test item bank. Dolansky et al. (2010) cited theoretical definitions of systems thinking as “(a) Sequence of events, (b) Causal sequence, (c) Multiple causations possible, (d) Variation of different types (random/special), (e) Feedback, (f) Interrelations of factors, patterns of relationships” (p. 5).

The experts reviewed 30 initial test bank items to validate appropriate indicators of the theoretical dimensions of systems thinking. In Phase II, 18 academic and practicing healthcare professionals participated in a preliminary field test to review the test bank items for clarity and instrument feasibility. Dolansky et al. reported 26 items were identified for psychometric analysis, which was subsequently performed in Phase III.

The purpose of Phase III included additional psychometric testing and feasibility of the STS. Over 550 healthcare professionals and healthcare professional
students from a variety of disciplines, provided input for psychometric testing and feasibility of the 20 item STS. Dolansky and the team of experts reported test-retest reliability correlation of .74 and inter-item reliability (Cronbach’s alpha coefficient of .89). Three groups of healthcare professionals received three levels of systems thinking education – pre-licensure nursing students, first year medical students, and graduate interprofessional students for example pharmacists and therapists. Discriminate validity was tested and revealed graduate prelicensure nursing students (N=32) received no intervention, first year medical students (N=78) received a two-hour class on an error case with two hour case study, and graduate inter-professional students (N=11) participated in 45 hours of classroom instruction and a quality improvement project. No differences were reported in STS pretest scores; however, the high-dose systems thinking education group scored higher on the STS than low group (p = .05), or no dose group (p = .01). Dolansky et al. (2010) reported the 20 item STS has good reliability and construct, and discriminate validity for public use to evaluate systems thinking and quality improvement processes.

A search using the specific terms “systems thinking in nursing” in CINAHL and Academic Search Premier, yielded no results. While there was no published research using the STS in nursing research, one published study used the STS to examine medical students’ safety knowledge and systems thinking. Aboumater et al. (2012) developed, implemented, and evaluated a patient safety curriculum and its effect on second year medical students’ safety knowledge, self-efficacy, and systems thinking. One hundred and twenty second year medical students participated in a
required three-day, patient safety intersession at the Johns Hopkins University School of Medicine. The required three day, clinically oriented safety session, consisted of simulation and skill-based activities on teamwork, communication, and systems-based thinking.

The authors reported safety knowledge scores significantly increased ($p < 0.001$). Using the STS developed by Dolansky et al. (2010), the researchers reported statistically significant amplification in systems-based thinking from pre-intersession to post-intersession scores ($p < 0.01$). Student pre- and posttest scores had statistical significance for self-efficacy, communication, and safety skills. The researchers provided evidence suggesting nursing and other healthcare professional programs may benefit from similar curricular activities to improve understanding of patient safety and systems thinking. While the STS has been used to measure system-based thinking among medical students, there is a gap in the literature examining how to teach and measure a systems thinking approach to patient safety with undergraduate baccalaureate nursing students.

**Summary**

Nursing faculty have a vested interest to prepare baccalaureate nursing students to ensure high-quality safe nursing practice in the United States (AACN, 2013; QSEN, 2013). Nursing curricula has focused quality and safety education at the individual level with specific safe practices, such as proficient medication administration and aseptic technique (Dolansky, Singh, & Neuhauser, 2009). Nurse educators are key leaders to bridge the gap of patient safety, education, and systems
thinking (Gregory, Guse, Dick, & Russell, 2007). Finkelman and Kenner (2012) argued that baccalaureate prepared nurses are change agents required to lead the healthcare movement in quality and safety to improve healthcare outcomes.

Nurse educators recognize a philosophy of “on-the-job, learn-as-you-go” (Howard, 2010, p. 168) training for new healthcare professionals is less than desirable to ensure positive patient outcomes (Ardizzone et al., 2009; Howard, 2010). Nurse educators are charged to develop, implement, and evaluate curricula and teaching strategies on patient safety knowledge, skills, and attitudes and systems thinking within undergraduate nursing programs.
Chapter Three

Methods

Introduction

The review of the literature pointed to the lack of understanding about implementation and evaluation of patient safety educational strategies with undergraduate baccalaureate nursing students. This study examined the impact of an on-campus clinical safety educational strategy (OCSES) on undergraduate baccalaureate nursing students’ knowledge, skills, attitudes about patient safety, and systems thinking. The overarching question was: Do baccalaureate nursing students’ patient safety knowledge, skills, attitudes, and systems thinking change after participating in a clinical safety educational strategy? This question was further delineated into four research questions. The information conveyed in Chapter Three includes in the following order (a) research design, (b) setting, (c) sample, (d) research questions, (e) measures, (f) procedure, (g) consent, (h) statistical analysis, (i) statistical plan, (j) data management, (k) data coding, (l) data cleaning, (m) missing data, and (n) protection of human subjects.

Research Design

The design of the study was a descriptive, pretest-posttest design. Sophomore and junior nursing students attending a baccalaureate nursing program constituted the study participants. A descriptive, one group pretest-posttest design was appropriate
since randomized control groups were not possible (Campbell & Stanley, 1963). According to Campbell and Stanley (1963), the threats to validity of a one-group pretest-posttest design include history, maturation, testing, instrumentation, and regression. Measurement of inter-rater reliability did not apply because each participant provided data. The one-group, pretest-posttest design measured change in learning over time; however, it did not account for control of history.

Setting

The study occurred in a baccalaureate nursing program in the Mid-Atlantic region of the United States. The institutional structure consisted of the Colleges of Arts and Sciences and Professional Programs, and a School of Graduate and Adult Education. The baccalaureate nursing program was housed within the College of Professional Programs.

Sample

The sampling design included a non-random sampling method known as a convenience sample. The sample size included all sophomore and junior nursing students attending the on-campus clinical experience. Approximately 46-60 students were enrolled in each nursing class and were eligible to participate. Power analysis using Faul, Erdfelder, Lang, and Buchner's, G*Power 3.1 (2007) technique was performed and revealed a minimum sample size of 28 was required with alpha ($\alpha$) = $\beta$ = .05, medium effect size, with power of .80.
Inclusion Criteria

Participants included in the study met the following criteria: all sophomore and junior nursing students currently enrolled in a clinical nursing course in the spring semester 2013, regardless of gender, age, grade point average, or past nursing clinical course attendance record.

Exclusion Criteria

Two criteria existed for participant exclusion. The first exclusion criterion was students who arrive more than 15 minutes late to the on-campus clinical experience. Reasoning for excluding students was that they would miss the introduction to the study, as well as the opportunity to sign the informed consent. The second exclusion criterion was any student who was unable to attend the on-campus clinical experience due to an emergent situation. The reason for exclusion was that the on-campus clinical experience was offered only one day.

Research Questions

The following four research questions (RQ) were posed:

(RQ1) Is there a change in baccalaureate nursing students' Healthcare Professionals Patient Safety Assessment Curriculum Survey (HPPSACS-A) safety knowledge scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?

(RQ 2) Is there a change in baccalaureate nursing students' HPPSACS-A safety skills scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?
(RQ 3) Is there a change in baccalaureate nursing students’ HPPSACS-A safety attitude scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?

(RQ 4) Is there a change in baccalaureate nursing students’ systems thinking scale scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?

Measures

The HPPSACS-A instrument was used to measure knowledge, skills, and attitudes and the Systems Thinking Scale (STS) was used to measured systems thinking (Appendices A and B). Using the HPPSACS-A, knowledge was measured by multiple-choice items 24-30. Each item had one correct answer. The HPPSACS-A instrument items 19-23 were used to measure patient safety skills. Each item was rated on a 5-point Likert scale ranging from Very Uncomfortable “1” to Very Comfortable “5”. Patient safety attitudes were measured by items 1-18. Each item was rated on a 5-point Likert scale ranging from Strongly Disagree “1” to Strongly Agree “5”. The STS is a 20-item instrument that measures dimensions of systems thinking. Each item was scored on a Likert-type scale ranging from: Never “0” to Most of the time “4”.

40
As noted in Table 1, two instruments used in the study were the HPPSACS-A & STS.

Table 1

*Measures of Patient Safety Knowledge, Skills, and Attitudes and Systems Thinking*

<table>
<thead>
<tr>
<th>Variable of Interest</th>
<th>Instrument to Measure</th>
<th>When Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge (7 items)</td>
<td>HPPSACS-A</td>
<td>Prior to Intervention</td>
</tr>
<tr>
<td>Skills (5 items)</td>
<td></td>
<td>Post Intervention</td>
</tr>
<tr>
<td>Attitudes (18 items)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systems Thinking</td>
<td>Systems Thinking Scale</td>
<td>Prior to Intervention</td>
</tr>
<tr>
<td>(20 items)</td>
<td></td>
<td>Post Intervention</td>
</tr>
</tbody>
</table>

**Healthcare Professionals Patient Safety Assessment Curriculum Survey- A**

The instrument entitled HPPSACS-A was used in this study to measure student nurses’ knowledge, skills, and attitudes of patient safety. Chenot (2007) and Chenot and Daniel (2010) adapted Madigosky’s instrument, the Patient Safety/Medical Fallibility Assessment Pre and Post Curriculum Survey (Madigosky et al., 2006). Chenot (2007) renamed the adapted instrument HPPSACS.

In Phase I of Chenot’s study (2007) a pilot test was performed to assess the HPPSACS instrument for reliability and construct validity. Exploratory factor analysis and alpha (α) reliability analysis were used to test validity and reliability on the HPPSACS. “Items on the patient safety instrument were grouped together to
form subscale scores by determining the underlying factor constructs” (Chenot & Daniel, 2010, p. 563).

For Phase II, Chenot reviewed the HPPSACS instrument and noted that five items related to knowledge were limited in scope and subsequently deleted. The investigator for this study concurred with Chenot’s evaluation of the Phase I instrument in regards to knowledge items. Therefore, knowledge items were revised for the purpose of this study while items measuring attitudes and skills remained the same. Hence, the instrument Chenot refers to as HPPSACS was adapted in the knowledge portion for this study and is now referred to as HPPSACS-A.

Knowledge of patient safety was measured using the HPPSACS-A instrument. Seven items (24-30) used a multiple-choice response and each item had only one correct answer. Two doctorally prepared nurse educators from the participating institution served as reviewers for the knowledge questions for face validity. Additionally, two senior level baccalaureate nursing students from the participating institution reviewed the questions for clarity. A total score was calculated by adding up all of the correct answers. Possible total scores ranged from 0 to 7 with higher scores reflecting additional knowledge.

HPPSACS-A patient safety skills were measured using five items (19-23) that measured the variable, skills. Each item was scored using a Likert-type scale: “1” = Very Uncomfortable, “2” = Uncomfortable, “3” = Neutral, “4” = Comfortable, and “5” = Very Comfortable. A rate for each item was calculated with a range from
one to five on a five-point scale. A total score was calculated and ranged from 1 to 5 with higher scores reflecting greater skill.

Eighteen items (1-18) were used to measure patient safety attitude using the HPPSACS-A instrument. Each item used a Likert scale: "1" = Strongly Disagree, "2" = Disagree, "3" = Neutral, "4" = Agree, and "5" = Strongly Agree. Participants rated each item. Items two, three, four, five, 11, 13, 14, 15, 16, and 17 were reverse coded and a total score was calculated. Participants rated each item and an average total score for each participant was calculated with a range from 1-5, with higher scores reflecting a stronger safety attitude.

The HPPSACS-A instrument also included six specific yes/no questions, which provided the researcher with a sense of history about student errors, and students’ perception about adequacy of patient safety coverage. Additionally, the instrument included demographic data such as age, gender, and prior work as a nurse assistant or a licensed practical nurse. The results were used as descriptors of the sample.

Chenot granted permission to use and adapt the HPPSACS Phase I Instrument for the purpose of this study (Appendix C). In addition to Chenot, the original developer, Madigosky, granted permission to use the instrument (Appendix D).
Systems Thinking Scale

Funded by The Robert Wood Johnson Foundation, the 20-item Systems Thinking Scale (STS), used in this study was developed by Dolansky et al., (2010) from the Frances Payne Bolton School of Nursing, Case Western Reserve University, Cleveland, Ohio. Approval to use the instrument was obtained from the co-principle investigator (Dolansky) prior to this study (Appendix E).

The authors evaluated the STS instrument for reliability and validity. According to Dolansky et al. (2010), the 20-item STS has good reliability and construct validity. Reliability and validity were assessed on the 20-item one-factor instrument. Test-retest reliability assessment (N=36) showed correlation of .74; internal consistency testing (N=342) using Cronbach’s Alpha had a coefficient of .89. Discriminate validity was tested with three groups of healthcare professions students (N=102) who received high, low, or no dose levels of systems thinking education related to process improvement. There were no differences in STS mean scores at pretest. At posttest, the high dose systems thinking education group scored significantly higher on the STS than both the low and no dose groups (p = .05 and .01, respectively).

Although the STS instrument has not been used to test the QSEN patient safety competency with baccalaureate nursing students, this investigator used the instrument to measure students’ participation in the OCSES. The 20-item instrument measures one dimension of systems thinking, interdependency. Each item was scored on a Likert-type scale: “0” = Never, “1” = Seldom, “2” = Some of the time, “3” =
Often, and “4” = Most of the time. The STS scores were calculated by summing all items scores, and can range from 0 to 80, with 80 being the upper limit score.

**Procedures**

Prior to students completing the pre- and posttests, the investigator coded each ParScore Scantron sheet using a unique identifier for sophomore and junior nursing students. The investigator filled in bubbles on ParScore Scantrons. The bubble “A” was filled in to represent the pretest, and bubble “B” represented the posttest. Additionally, the name (HPPSACS- A and STS) of each pre and posttest was noted in the upper right hand corner on the ParScore Scantron sheets. The investigator did not include student identifying information on ParScore Scantron sheets.

Unique identifiers consisted of a set of numbers from 000001 to 000060 for sophomore nursing students, and 000100 to 000146 representing junior students. In a Microsoft Excel spreadsheet, the investigator created a codebook that included students’ unique identifiers and noted “A” as the pretest and “B” as the posttest.

Sophomore and junior students enrolled in a clinical nursing course were required to attend an on-campus clinical experience. The institution where the educational experience took place defines a clinical nursing course as both didactic and experiences where patient care is performed by students and directed by nursing faculty in a variety of healthcare settings. On the day of the on-campus clinical experience, the investigator informed students of the study. While the on-campus clinical experience was mandatory, participation in the study was voluntary. On
entering the room, sophomore and junior nursing students were directed to perform
the following procedure:

1. Pick up instruments that served as pre- and posttests: HPPSACS-A and
   STS.

2. Pick up two ParScore Scantron sheets to be used to complete the pre- and
   posttest for the HPPSACS-A. The unique identifier on pretests ParScore
   Scantron sheets matched the unique identifier on posttests ParScore
   Scantron sheets.

3. Pick up two ParScore Scantron sheets to be used to complete the pre- and
   posttest for the STS. The unique identifier on pretests ParScore Scantron
   sheets matched the unique identifier on posttests ParScore Scantron sheets.

Obtaining Consent

On the day of the on-campus clinical experience, the investigator provided
students with an informed consent letter that explained the study. Questions from
students were answered, and students were informed that although participation in the
on-campus clinical experience was required, they were not required to complete the
pre- or posttests, however, completing the tests indicated consent to participate.
Students were assured that non-participation in the study would not influence their
nursing clinical course grade or progression in the nursing program.

If students agreed to participate, they were asked to complete both pretests
(HPPSACS-A and STS). The approximate time to complete both pretests was 15
minutes. Students submitted completed ParScore Scantron sheets in boxes labeled
Pretest: HPPSACS-A, and Pretest: STS. If any students declined to participate, the blank instruments and ParScore Scantron sheets were returned. Students submitted blank HPPSACS-A and STS and ParScore Scantron sheets in the same box as those students who completed the pretests and ParScore Scantron sheets.

Submission of Posttests

At the conclusion of the on-campus clinical safety educational strategy, participants completed two posttests, HPPSACS-A and STS. The approximate time to complete both posttests was 15 minutes. Participants submitted completed ParScore Scantron sheets in boxes labeled Posttest: HPPSACS-A, and Posttest: STS. Students who declined to complete pretests submitted blank posttests and blank ParScore Scantron sheets in the same box as those students who completed the posttests. After submission of both posttests, students completed an evaluation form to rate the degree to which objectives were met and their reaction to the OCSES (Appendix F). This evaluative process supports Kirkpatrick’s (1996, 1998) framework of program evaluation.

Incentives

Participants who completed the pre- and posttests were eligible to win a gift card worth $25.00. Students indicated if they completed the test using an honor system. The following procedure was followed:

1. First Drawing: After completing both pretests, participants took a raffle ticket located near the boxes labeled Pretest: HPPSACS-A, and Pretest: STS. They were instructed to keep one portion of a two-part raffle ticket,
and deposit the second, matching raffle ticket in a container. Participants were also instructed to not inscribe any identifying information on the ticket. A volunteer student drew one winning ticket after students completed the pretest.

2. Second Drawing: Upon completion of both posttests, the participants took a raffle ticket located near the boxes labeled Posttest: HPPSACS-A, and Posttest: STS. Participants retained one portion of a two-part raffle ticket, and deposited the second, matching raffle ticket in a container. Participants were instructed not to place any identifying information on the ticket. One winning ticket was drawn by a volunteer student immediately following students' completion of the posttests.

3. During student completion and submission of pre- and posttests, faculty stepped outside the room.

**On-Campus Clinical Safety Educational Strategy**

The on-campus clinical experience included a safety educational strategy, herein referred to as on-campus clinical safety educational strategy (OCSES). The primary purpose of the OCSES was for students to recognize knowledge, skills, and attitudes, and the use of systems thinking needed for every nurse within the context of the QSEN competency, patient safety. Four major objectives for the OCSES that mirror the patient safety QSEN competency included: (a) identify various methods that ensure recognition of patient safety risks, (b) demonstrate effective communication techniques when disclosing an error, (c) articulate awareness of
strategies to mitigate harm through the systems approach, and (d) apply quality improvement tools for process and system improvement.

The OCSES used a three-pronged approach (Appendix G). The first prong consisted of an introduction to patient safety risks using a video (The Josie King Story-12 minutes), and continued with a patient safety slide presentation noted as a theory burst. This slide presentation was adapted from Phase III of the QSEN National Initiative. Using a medication error case study, the second prong included students’ discussion of their reaction to making an error that is based on Banja’s work (2005). Students completed (a) a flow chart on how the error occurred, (b) a mock adverse event report, and (c) role played how to communicate an error to a professional nurse in a supervisory role.

As the last prong, students examined a medication error case study from a systems perspective. Students completed a root cause analysis by using a quality improvement tool, fishbone diagram, and identified potential causes for a medication error. This prong was supported by Swayne, Duncan, and Ginter (2006) who stated that one of the benefits of systems thinking is identifying and understanding the larger picture. Discussion centered on how leadership within organizations establish a framework for improvement, and subsequently identify priority areas for enhancement. Using medication errors as an example of a priority area for improvement, the development process was described as noted in White (2012).
Statistical Plan for Research Questions

Descriptive statistics were used to describe demographic information such as class level, gender, and experience as a nursing assistant or licensed practical nurse, as well as mean and standard deviation for pre- and posttest scores. Inferential statistics, a paired t-test, was used to test significant differences between the pre- and posttests for each of the following research questions: (RQ1) Is there a change in baccalaureate nursing students’ Healthcare Professionals Patient Safety Assessment Curriculum Survey (HPPSACS-A) safety knowledge scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?; (RQ2) Is there a change in baccalaureate nursing students’ HPPSACS-A safety skills scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?; (RQ3) Is there a change in baccalaureate nursing students’ HPPSACS-A safety attitude scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?; and (RQ4) Is there a change in baccalaureate nursing students’ systems thinking scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy? The alpha (α) level for all analyses as appropriate was $p \leq .05$.

Data Management

Data were collected using Scantron sheets designed specifically for PARScore testing software. Only the investigator had access to the raw item and overall test scores. The response PARScore Scantron sheets were entered directly into a computer for optic scanning and information was stored for analyses. Item and
overall scores were stored in PARScore located on the investigator’s computer. Data were backed up and stored on a separate drive. The investigator’s computer and access to PARScore software application are password protected.

Data were maintained on a Universal Serial Bus (USB) located in a locked filing cabinet drawer within the investigator’s employment office. Data will be kept for four years following the last publication of the proposed study.

Data Coding

As noted earlier, the investigator created a codebook with unique identifiers for study participants. Data from PARScore was subsequently entered manually into Statistical Plan for the Social Sciences (SPSS) 21.0 files.

Data Cleaning

Implementing error-prevention strategies achieves accuracy of data analysis (Burns & Grove, 2009). To minimize errors, each PARScore Scantron sheet was visually inspected by the investigator for completion of all item responses prior to entering into the electronic PARScore device and SPSS. Any incomplete PARScore Scantron sheets were eliminated from data entry.

Missing Data

The amount of missing data was explored. If missing data were less than 10% in any given instrument, replacement occurred with the group mean. For greater than 10% missing, the case was eliminated.

51
Protection of Human Subjects

Participation in the proposed study was voluntary. There were no anticipated physical risks; however, a participant could have experienced psychological stress if he or she was prone to test anxiety. A participant could have experienced anxiety if he or she believed that their success or progression in the nursing program was contingent upon participation in the study. Additionally, a participant with a documented learning disability could voice apprehension about the environment not being conducive to test taking. If any student was receiving testing accommodations, for course related tests, same accommodations were not afforded for this study.

Instead, students had the option to not participate in this study. While no participant expressed psychological stress, the investigator would have supported a participant’s decision not to participate in the study if he or she anticipated or experienced feeling anxious prior to taking the pre- and posttest.

Institutional Review Board (IRB) permission was obtained from the Alvernia University IRB and Case Western Reserve University IRB. A research summary sheet was submitted (Appendix H) that informed students of the voluntary nature of the study, risks, benefits, procedures, confidentiality, and who to contact with questions. Course grades were awarded to students prior to review of data.
Chapter Four

Results

This study examined the impact of an on-campus clinical safety education strategy (OCSES) on undergraduate baccalaureate nursing students’ knowledge, skills, and attitudes about patient safety, and systems thinking. The on-campus educational strategy took place in a baccalaureate-nursing program in the mid-Atlantic region of the United States. This descriptive study sought to answer the overarching question: Do baccalaureate nursing students’ patient safety knowledge, skills, and attitudes and systems thinking change after participating in a clinical safety educational strategy. The research questions proposed were:

1. Is there a change in baccalaureate nursing students’ Healthcare Professionals Patient Safety Assessment Curriculum Survey (HPPSACS-A) safety knowledge scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?

2. Is there a change in baccalaureate nursing students’ HPPSACS-A safety skills scores from pre-test to posttest for students who participate in an on-campus clinical safety educational strategy?

3. Is there a change in baccalaureate nursing students’ HPPSACS-A safety attitude scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?
4. Is there a change in baccalaureate nursing students’ systems thinking scores from pretest to posttest for students who participate in an on-campus clinical safety educational strategy?

Sample

A convenience sample of 84 undergraduate sophomore and junior nursing students volunteered to participate in the study. The sample size exceeded the minimum requirement of 28 identified in the power analysis using Faul, Erdfelder, Lang, and Buchner’s, G*Power 3.1 (2007) technique with alpha (α) = p = .05, medium effect size, with power of .80. Descriptive statistics were used to analyze data obtained from the demographic portion of the survey.

Class level, Gender, and Age

Forty-seven sophomore and 37 junior students participated in the study. The sample consisted of predominately females (86%). Females were represented equally in both levels with sophomores at 85% and juniors at 86%. Students’ age fell within a range from 18-54 years with 90% falling within 18-24-year-old range.

Job Experience

Of the total participants, 56% of students had no work experience as a nursing assistant or licensed practical nurse. On average, students reported current or prior work experience as nursing assistants (40%) and licensed practical nurses (4%). A further breakdown of job experience revealed 38% of sophomores work or worked as a nursing assistant and 4% practice or practiced as a licensed practical nurse. Of the junior level students, 43% work or worked as nursing assistants while 3% worked or
work as a licensed practical nurse. Table 2 illustrates a comprehensive overview of demographics.

Table 2

**Demographic Data**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td>n = 47(56%)</td>
<td>n = 37(44%)</td>
<td>N= 84</td>
</tr>
<tr>
<td>Age</td>
<td>42 (89%)</td>
<td>34 (92%)</td>
<td>76 (90%)</td>
</tr>
<tr>
<td>18-24</td>
<td>2 (4%)</td>
<td>2 (5%)</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>25-34</td>
<td>2 (4%)</td>
<td>1 (3%)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>35-44</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Gender</td>
<td>Females</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job experience</td>
<td>No Experience</td>
<td>27 (58%)</td>
<td>20 (54%)</td>
</tr>
<tr>
<td>Nursing Assistant</td>
<td>18 (38%)</td>
<td>16 (43%)</td>
<td>34 (40%)</td>
</tr>
<tr>
<td>Licensed</td>
<td>2 (4%)</td>
<td>1 (3%)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Practical Nurse</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data cleaning processes were performed by examining frequencies for all variables to check for adequate variance, missing values, miscodes, outliers, normality, and sample size. Skewness and kurtosis were checked for all variables to test for normal distribution. A total of 103 sophomore and junior students attended the on-campus clinical experience. Ninety-six students agreed to participate in the study. Twelve
participants had greater than 10% missing data; therefore, these participants were dropped from analysis giving a total sample of 84. Missing data included the following: no pretest or posttest submitted, multiple answers for a single response item, multiple items missing responses, or incorrectly coded ParScore Scantron cards.

**Research Question One**

A significant difference was not noted for the total score on the knowledge of patient safety scale from pre- to posttest (pretest mean = 4.4; posttest mean = 4.3; \( t = 1.28 \), \( p = .203 \)). Comparing pre- and posttest, posttest scores decreased. The participants answered 4.4 out of seven questions correctly on the pretest and 4.3 questions out of seven on the posttest.

**Research Question Two**

A mean pretest score of 3.2 as compared to posttest score of 3.7 revealed a significant difference in patient safety skills as indicated by the 2-tailed \( p \)-value of .0.

**Research Question Three**

A mean pretest score of 3.6 as compared to a posttest score of 3.6 indicated there was no statistically significant difference in patient safety attitudes as indicated by the 2-tailed \( p \)-value of .29. Table 3 illustrates statistical outcomes for patient safety knowledge, skills, and attitudes.
Table 3

Patient Safety: Knowledge, Skills, and Attitudes Table

<table>
<thead>
<tr>
<th>Patient Safety</th>
<th>Pretest Mean</th>
<th>Posttest Mean</th>
<th>t-test</th>
<th>p value</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>4.4</td>
<td>4.3</td>
<td>1.28</td>
<td>.203</td>
<td>0.078 - 0.364</td>
</tr>
<tr>
<td>Skills</td>
<td>3.2</td>
<td>3.7</td>
<td>-6.20</td>
<td>.000</td>
<td>-0.695 - -0.358</td>
</tr>
<tr>
<td>Attitudes</td>
<td>3.6</td>
<td>3.6</td>
<td>1.07</td>
<td>.287</td>
<td>-0.027 - 0.092</td>
</tr>
</tbody>
</table>

Note. Patient Safety Skills and Attitudes are reported on a 5-point Likert Scale & Patient Safety Knowledge scores are scored on a range from 0 to 7.

Research Question Four

A significant difference ($p = .000$) was noted for the total score on the STS scale from pre- to posttest. Participants scored higher in the posttest ($M = 65.59$) as compared to pretest scores ($M = 60.0$). Table 4 illustrates statistical significance for systems thinking.

Table 4

Systems Thinking Scale Table

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Pretest Mean</th>
<th>Posttest Mean</th>
<th>t-test</th>
<th>p value</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems Thinking</td>
<td>60.0</td>
<td>65.6</td>
<td>-4.656</td>
<td>.000</td>
<td>-7.96851 - -3.19816</td>
</tr>
</tbody>
</table>

Scale
This study determined the effect of an on-campus clinical safety educational strategy on undergraduate nursing students' patient safety knowledge, skills, attitudes, and systems thinking. While there was no statistical significance in students' patient safety knowledge and attitudes, there was statistical significance with students' patient safety skills. Statistical significance was also noted with students' systems thinking. Chapter Five presents a discussion of findings and implications for future nursing education.
Chapter Five

Discussion

The purpose of this study was to examine the impact of an on-campus safety education strategy (OCSES) on undergraduate baccalaureate nursing students' knowledge, skills, and attitudes about patient safety and systems thinking. This chapter sets forth a discussion of the research findings. It then outlines limitations of the study, provides recommendations for future studies, offers implications for nursing education curricula development, and ends with concluding statements.

This current study contributed to the literature in two ways. The first way was to examine sophomore and junior students enrolled in an undergraduate baccalaureate-nursing program. The majority of other studies used senior level nursing students or other nurses in practice (Chenot & Daniel, 2010; Duhn et al., 2012; Miller & LaFramboise, 2009). Second, in contrast to other studies that examined patient safety at various points within a semester or an entire program, this study examined one four-hour intervention. It is important to determine if a short session will contribute to nursing student's patient safety knowledge, skills, and attitudes and systems thinking.
Patient Safety Knowledge

There was no difference in patient safety knowledge, from pretest to posttest. This finding was not consistent with patient safety research involving medical student educational curricula. Knowledge scores improved after second and senior year medical students participated in patient safety strategies courses (Abdi, et al., 2012; Aboutmatar et al., 2012; Madigosky et al., 2006). Additionally, similar findings were obtained with medical residents (Jansma et al., 2011). Lev Vygotsky’s social developmental theory may explain this positive effect. Graduate and post graduate students, specifically second and senior year medical students and medical residents, may have more knowledge and experience in healthcare to draw upon to scaffold learning. In nursing, we have not measured patient safety knowledge with sophomore and junior undergraduate baccalaureate nursing students using a short educational activity. Dedicated patient safety educational courses, like those in medicine, were not evaluated in nursing educational research.

Several factors may have contributed to why we did not find a difference in knowledge from pre- to posttest. These factors are broadly defined into four categories, (a) the relevance of the knowledge questions within the context of the intervention, (b) level of nursing student participants, (c) placement of the patient safety content in nursing program curricula, and (d) didactic delivery of knowledge content.

The first factor that may have influenced patient safety knowledge scores was the relevance of the knowledge items in relation to the content delivered in the
intervention. A retrospective review of the intervention in relation to the knowledge items revealed that there were gaps in aspects of the test items and the intervention. Some items tested previous student knowledge or items were not specifically covered in the intervention. In addition, the researcher developed and included seven multiple-choice knowledge questions. Individual knowledge items on the HPPSACS-A instrument showed that participants had greater difficulty with responses to test items that were “Select all that apply.” Although two doctorally prepared nurse educators from the participating institution served as reviewers for face validity and two senior level baccalaureate-nursing students from the participating institution reviewed questions for clarity, further testing and refinement of knowledge items is warranted.

The second factor that may have influenced the outcome of not improving students’ safety knowledge was the level of nursing students who participated in the study. It is possible that sophomore and junior nursing students have limited knowledge of patient safety and experiences to draw upon. If we had studied senior nursing students, we may have found that exposure to additional clinical learning may have a more positive outcome in patient safety knowledge. While patient safety is integrated throughout nursing clinical courses, sophomore nursing students participated in only one nursing clinical course and junior nursing students nearly completed three clinical nursing courses at the time of the intervention. Due to unforeseen circumstances, only 50% of all students had an opportunity to administer medications in the clinical environment the semester in which the current study was
conducted. Lack of prior learning may have been a barrier that impaired scaffolding of new information. Students had limited prior experiences to build the current knowledge upon. Furthermore, the majority of participants (56%) did not have current or prior work experience in a healthcare environment suggesting that students with limited experience working in a healthcare environment may need additional exposure to classroom and clinical experiences related to patient safety to facilitate scaffolding and learning.

The third factor that may have contributed to research results may be the placement of the intervention in the semester of study. Implementation of the intervention took place at the near conclusion of a semester. Introduction of the intervention prior to the first nursing course and scaffolding during the semester may provide an opportunity for students to apply patient safety information in a more meaningful way. While patient safety content areas are threaded throughout didactic and clinical experiences at participating institutions, there may be gaps in program curricula that may have contributed to less than expected results.

The last factor was that patient safety knowledge content was delivered primarily through didactic presentation. This limited exposure to scaffolding so students did not have the opportunity to process this content with faculty and knowledgeable peers. Future interventions may need to be reinforced with not only didactic, but various teaching strategies that are experiential such as simulation-based learning.
Patient Safety Skills

Student nurses' self-report of patient safety skills showed a statistically significant improvement at the completion of the program. This was consistent with prior research in which an educational intervention resulted in improvement in medical students' ability and skill to identify, cope, and manage medical errors or unintended events in healthcare (Abdi, et al., 2012; Aboumatar et al., 2012). This finding was also consistent with nursing students where a combination of didactic and clinical learning activities had the most positive impact on nursing students' perception of patient safety skills related to quality and safety (Miller & LaFramboise, 2009).

The intervention for this current study had a positive change in students' safety skill awareness from pre- to posttest. Presentation of didactic content along with interactive activities for auditory, kinesthetic, and visual learners created a positive learning environment for patient safety skills content. The presentation of the skill component for the intervention in this study included students' actively working with peers on skills such as how to disclose an adverse event, how to complete an incident report, and how to analyze causes of medical errors. Improvement in patient safety skills occurred with active engagement in learning these skills. In addition, improvement in patient safety skills scores may have occurred due to scaffolding that took place with not only knowledgeable faculty but with students' social interaction with peers.
Lev Vygotsky’s social developmental theory, grounded in social cognitivism and social constructivism guided the intervention of the study (Utley, 2011; Vygotsky, 1978). This theory, which emphasizes that learning builds upon previous learning and takes place in social interactions with meaningful and clearly defined activities under the guidance of a knowledgeable adult may have influenced participant self-report of patient safety skills (Bastable, 2008; Darity, 2008; Utley, 2011). For example, the researcher purposefully placed sophomore and junior nursing students together in groups of five to seven students to work together and apply their learning in a meaningful way. During skills activities, sophomore students drew upon their individual knowledge and experience and the knowledge and experience shared from other sophomore and junior nursing students. Scaffolding of new information occurred as students’ achieved the learning objectives during social interaction with knowledgeable faculty and peers (Chen et al., 2009; Grendler, 2005; Sanders & Welk, 2005; Wink & Putney, 2002).

**Patient Safety Attitudes**

The results from this present study did not provide evidence that the OCSES promoted an increase in baccalaureate nursing students’ attitudes. This finding was not consistent with medical educational curricula research (Abdi, et al., 2012; Aboutmatar et al., 2012; Jansma, et al., 2011; Madigosky et al., 2006). One study conducted with senior year medical students showed attitudes improved after participation in a patient safety course (Abdi et al., 2012). Second year medical students’ responses to some attitude response items improved from pre- to posttest.
immediately after students’ participated in curricula while other attitude items showed sustained improvement at one year following curricula participation (Madigosky et al., 2006). Responses with immediate improvement after course participation and at one year were the inevitability of medical errors, effectiveness of human versus systems responses to errors, and physician competence and medical errors (Madigosky et al, 2006). A possible explanation for differences between nursing and medical related studies could be that graduate students, specifically second and senior year medical students, may have patient safety knowledge or healthcare experience to draw upon to scaffold learning as compared to limited healthcare experiences of sophomore and junior undergraduate nursing students.

The results of this current study did not show a significant change in the majority of the 18 attitudes items; however, a shift in student responses was noted with four attitude items. In this current study, a shift occurred in students’ attitude about the inevitability of making an error in healthcare (Item 1). More students believed that errors are inevitable after the intervention. This attitude item was consistent with reported findings in medical students’ research (Madigosky et al., 2006). The second attitude item which paralleled Madigosky was noted by an increase in students’ perception that competent healthcare professionals do make medical errors (Item 2). After the OCSES, students seemed to acknowledge that errors can occur regardless of competence.

Similar to Madigosky, a positive shift was also noted in students’ perception that reporting systems do reduce future errors (Item 11). The fourth item in this
current research that had a positive shift was the change in student responses to healthcare professionals and tolerance of uncertainty (Item 5). A shift in emphasis from pre-to posttest indicated that students felt healthcare professions should not tolerate uncertainty in patient care. An error is more likely to occur when uncertainty is tolerated. This shift was consistent with Jones (2013).

The fact that this study did not demonstrate a significant improvement with all patient safety attitudes may be related to several factors, such as the length of the HPPSACS-A instrument, student ability to discern attitude items, and students’ limited exposure to healthcare professionals and how professionals interact and work in healthcare systems. First, the HPPSACS-A instrument included a total of 40 items, 18 items of which reflected patient safety attitudes. This researcher reverse coded nine of the 18 attitude items (Items 2, 4, 5, 11, 13, 14, 15, 16, 17) as did the original developer, Madigosky, of the knowledge, skills, and attitudes questionnaire for medical students. Reverse coding of an item forces the reader to read each item closely; however, those that do not read each item closely may answer questions without thoughtful reflection. The high percentage of reverse coded items may have affected the reliability of the answers.

Further analysis of attitude items suggests that items may be geared to the student transitioning to a professional nurse role rather than a sophomore and junior student with a focused student role. Chenot and Daniel (2010) reported the HPPSACS instrument was piloted with working professional registered nurses in Phase I of their research project. Sophomore and junior undergraduate nursing
students in this current study had limited experience working with healthcare professionals. These students may be entrenched in their student role with limited exposure or consideration of other healthcare professional roles and responsibilities, all of which may have contributed to attitude item scores. Moreover, it may not have been realistic to expect a change in attitude after one four hour intervention. Students may need observation and participation in of a variety of healthcare experiences and interaction with healthcare professionals over time to commit to act. Further research that provides additional patient safety content in classroom and clinical experiences will allow students to gain additional exposure to healthcare professionals and clinical situations. Testing students prior to beginning their first nursing clinical course, immediately after an intervention, followed by testing at the conclusion of each nursing course would evaluate a sustained impact over time.

**Systems Thinking**

The OCSES positively impacted a systems thinking approach to patient safety with undergraduate baccalaureate nursing students. The finding was consistent with prior work that found that nursing and other healthcare professional programs may benefit from curricular activities to improve understanding of patient safety and systems thinking (Aboumater et al., 2012; Dolansky & Moore, 2013). The content of the OCSES may have had a positive outcome for this current study. The intervention in this current study introduced participants to examine patient safety from a systems thinking perspective. A didactic presentation followed by content
application using a fishbone diagram of a medication case study may have increased participants' learning.

The OCSES may have broadened thinking about medical errors with a change in the focus of error from the individual to possible multiple causes and sequence of events. Future improvement to the intervention may include integrating content in the didactic and clinical environment in each nursing course as part of required curricula. Using the STS with a randomized controlled longitudinal study may be conducted to test the long-term impact on systems thinking learning.

Limitations

Limitations are evident in the current study. Limitations include the OCSES delivery time and the research design. This study used a one four-hour educational strategy that offered limited student exposure to new content related to patient safety and systems thinking. Additional sessions integrated throughout didactic and clinical experiences may enhance student learning.

Using a control group with undergraduate baccalaureate nursing students may offer a stronger design. The investigator used a convenience sample of nursing students from one location so the results have limited generalizability. There may be something at this local setting that is different from other academic settings. This study occurred with a homogeneous student population of traditional aged college students, 18-24 years, from the Mid-Atlantic region of the United States which may be different from other pre-licensure nursing programs. Future study with a diverse student population from multiple universities or types of pre-licensure programs, in
other regions of the country, along with the use of randomized control may improve the strength of the study and generalizability of results.

**Implications**

As future professional nurses who will be responsible for ensuring patient safety and providing quality care, undergraduate baccalaureate nursing students must learn safety approaches early in their education if medical errors are to decrease. If nurse educators hope to develop students' ability to include systems thinking in patient care situations, faculty must expand nursing curricula to incorporate not only a focus on patient safety, but also integrate teaching approaches to include systems thinking perspectives. Standardized curricular activities in clinical education may be the most effective method to improve patient safety in learning and clinical practice.

**Additional Clinical Learning to Teach Safety Principles and Systems Thinking**

This study used a one four-hour educational approach. To expand the opportunity to teach safety and systems thinking, meaningful clinical learning for students needs to occur in real life clinical settings and simulated laboratory based experiences. Implementation of focused patient safety teaching strategies integrated in clinical instruction can provide structure for student clinical performance and discussion points during conference time to facilitate meaningful application of learning. For example, nurse educators could introduce student nurses to the Joint Commission National Patient Safety Goals in the classroom and ask students to utilize the national standards to evaluate patient safety in an acute care setting. This
encourages students to recognize unsafe clinical situations and consider recommendations for improved patient safety.

Addressing patient safety education with a systems thinking approach is crucial to integrate across curricula beginning in foundational nursing courses and clinical experiences in simulated based learning. Students can build upon classroom instruction on how to perform a root cause analysis of an adverse event and transition learning with application in simulated scenarios. Simulation-based learning can offer students the opportunity to gain expertise in safe medication administration and make connections with classroom and laboratory learning. For example, in a pre-planned scenario a student would role play and be directed to make a medication error. The student would draw up and administer an incorrect dosage of heparin, a high-risk medication. Upon conclusion, students can perform a root cause analysis of the adverse event which encourages students to recognize precipitating factors or individual factors that led to the medication error.

**Future Research**

Healthcare professionals and pedagogical experts acknowledge that errors occur even with the best of planning; however, nurse educators must continue to strive to teach a culture of safety (Barnsteiner, 2011). Studies are warranted to evaluate the effectiveness of patient safety teaching strategies with undergraduate baccalaureate nursing students. Not only do nurse educators need to teach a culture of safety, but they also need to evaluate student learning and educational program content with implementation of research. Planning and evaluation of educational
processes can be addressed through research using criteria developed by Donald Kirkpatrick (1996).

As Kirkpatrick notes (1996, 1998), there are four steps or levels for evaluation of participant learning in educational programs. These four steps include Level one: Reaction, Level two: Learning, Level three: Behavior, and Level four: Results. In level one the educator focuses on the assessment of how well the participant liked an educational program to make program improvements; however, this does not assure that participant learning took place. In level two the evaluator measures participant acquisition of knowledge, skills, or attitudes in an objective manner based on a careful analysis with paper and pencil test or a skills performance test. Level three includes assessment of change in participant behavior over time, and level four evaluates a program in terms of the clinical impact.

Future research studies can be mirrored after Kirkpatrick’s framework to assess student learning over time and address the QSEN competency patient safety and quality improvement. Investigations can be developed, implemented, and assessed over time with the use of didactic lectures, case studies, and simulated based learning settings with undergraduate baccalaureate nursing students. The overall goal of research is to determine if future nurses and healthcare professionals are able to meet patient care challenges with requisite knowledge, skills, and attitudes and systems thinking necessary to deliver high quality safe care and reduce the number of actual and near miss adverse events. Kirkpatrick’s evaluation structure has the
potential to improve nurse educators’ efforts to deliver patient safety and systems thinking educational curricula.

Initial study could include a one group pretest-posttest design to measure sophomore undergraduate nursing student satisfaction and patient safety knowledge, skills, and attitudes and systems thinking learning based on didactic, case study, and simulated patient care scenarios of an adverse event with standardized nurse and patient roles. Debriefing after a patient care scenario (PCS) would include analysis of patient safety errors from a systems thinking perspective. Revisions to teaching and future simulated scenarios can be addressed based on the effectiveness of the intervention and analysis of posttest results, Kirkpatrick’s model level one and two.

A revised simulated based PCS to address patient safety and systems thinking can be incorporated in junior nursing students’ clinical experiences based on previous feedback. A posttest of patient safety knowledge, skills, and attitudes and systems thinking would be re-administered at the conclusion of the spring semester of junior year. Evaluation of behavior change, level three of Kirkpatrick’s model, can be accomplished with clinical preceptors’ evaluation of student performance.

The last tier of research could encompass nursing program goals that address Kirkpatrick’s level four, results. This tier would examine clinical outcomes such as a decrease in the total number of actual or near miss events. A quasi-experimental pretest-posttest design that would include participants from multiple nursing program sites would measure student learning and program outcomes. Use of multiple nursing program sites and types of programs may improve generalizability of research results.
Results could be addressed with measurement of a posttest patient safety knowledge, skills, and attitudes and systems thinking scores. A comparison could be made with the control group and experimental group results. Additionally, longitudinal data could be analyzed and compared with the original experimental group to evaluate the impact on students' patient safety knowledge, skills, and attitudes and systems thinking awareness. In addition, program goals could be examined to determine if the total number of adverse and near miss events decreased from beginning to conclusion of study.

Conclusions

The purpose of this study was to determine the effect of an on-campus clinical safety educational strategy on undergraduate baccalaureate nursing students' patient safety knowledge, skills, and attitudes and systems thinking. While there was no statistical significance in patient safety knowledge and attitudes, there was a significant change in patient safety skills and systems thinking among sophomore and junior undergraduate baccalaureate nursing students. This current study is important to nursing education. Findings from this study add to the body of knowledge on patient safety knowledge, skills, and attitudes, systems thinking, and address the gap in nursing literature. As delivery of patient care continues to become more complex, it becomes more important to understand how to effectively teach the QSEN patient safety competency to ensure enhanced knowledge, skills, and attitudes and systems thinking. The education of students is an important step to improve professional nurses' delivery of high-quality safe patient care.
References


MNCOKFGFBMFHBA00&Abstract=S.sh.18.19.23.27%7c22%7c1


82


Appendices

Appendix A

HEALTHCARE PROFESSIONALS PATIENT SAFETY ASSESSMENT CURRICULUM SURVEY-A

INSTRUCTIONS

Identify the letter that corresponds to your level of agreement with the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Making errors in healthcare is inevitable.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>2. Competent healthcare professionals do not make</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>medical errors that lead to patient harm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Healthcare professionals should routinely spend</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>part of their professional time working to improve</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>patient care.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4. Only physicians can determine the causes of a</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>medical error.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Healthcare professionals should not tolerate</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>uncertainty in patient care.</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>6. The culture of healthcare makes it easy for</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>healthcare professionals to deal constructively with</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>errors.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Learning how to improve patient safety is an</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>appropriate use of time in health programs in school.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Healthcare professionals routinely share information</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>about medical errors and what caused them.</td>
<td></td>
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<tr>
<td>9. In my clinical experiences so far, faculty and staff</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>communicate to me that patient safety is a high</td>
<td></td>
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<tr>
<td>priority.</td>
<td></td>
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</tr>
<tr>
<td>10. Healthcare professionals routinely report medical</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>errors.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Reporting systems do little to reduce future errors.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>12. Physicians should be the healthcare professionals</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>that report errors to an affected patient and their</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>family.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>13. Effective responses to errors focus primarily on the</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>healthcare professional involved.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>14. If there is no harm to a patient, there is no need</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>to address an error.</td>
<td></td>
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</tr>
</tbody>
</table>
15. If I saw a medical error, I would keep it to myself. A B C D E
16. Most errors are due to things that healthcare professionals can't do anything about. A B C D E
17. After an error occurs, effective strategy is to work harder to be more careful. A B C D E
18. There is a gap between what we know as 'best care' and what we provide on a day to day basis. A B C D E

**Instructions**

Identify the letter that corresponds to your level of comfort with doing the following:

<table>
<thead>
<tr>
<th>Very Comfortable</th>
<th>Comfortable</th>
<th>Neutral</th>
<th>Uncomfortable</th>
<th>Very Uncomfortable</th>
</tr>
</thead>
</table>

19. Accurately completing an incident report. A B C D E
20. Analyzing a case to find the causes of an error. A B C D E
21. Supporting and advising a peer who must decide how to respond to an error. A B C D E
22. Disclosing an error to a faculty member. A B C D E
23. Disclosing an error to another healthcare professional. A B C D E

**Instructions:** Identify the letter that corresponds to your best answer:

24. Which of the following medication orders is written correctly?
   a. Depakote 250 mg PO QD
   b. Digoxin 0.125 PO QOD
   c. Ativan 1.0 mg daily
   d. Nortriptyline 10 mg PO daily
25. Which of the following nursing actions may prevent a medication error?
   a. Identify the patient using a bar-code scanner.
   b. Unwrap prescribed medications prior to entering the patient’s room.
   c. Verify the medication order after administering medication to patient.
   d. Rely on another nurse to clarify medication order.

26. New IV pumps are introduced to the clinical unit. A detailed set of operating instructions along with pictures are attached to each pump. Which of the following strategies would the nurse use that indicate why the instructions and graphs are needed?
   a. Involve patients in their care.
   b. Decrease the risk of litigation if errors occur.
   c. Standardize the instructions to use the device safely.
   d. Limit the number of staff development sessions on the new equipment.

27. Which common errors occur in healthcare? Select all that apply.
   a. Surgery – wrong site
   b. Equipment failure – IV pump
   c. Knowledge deficiency
   d. Noncompliance of patients
   e. Performance issues with staff

28. If the pharmacy makes an error in dispensing a medication and the improper medication or dose is administered by a nurse, which of the following actions should the nurse perform? Select all that apply.
   a. Inform the patient of the error and tell the patient that the pharmacy was the cause of the error.
   b. Examine the sequence of events leading up to the error.
   c. Identify ways to prevent the error from re-occurring.
   d. Not disclose the error and request a member of the pharmacy department disclose the error.

29. The first step using a fishbone (cause and effect) diagram is to:
   a. Identify a specific plan for change.
   b. Establish responsibility for change.
   c. Identify who is at fault.
   d. Identify the problem/issue.
30. Which of the following descriptions from the Institute of Medicine's (IOM) Report describe safe care?
   a. Avoiding injuries from nursing activities which are otherwise intended to help patients.
   b. Providing services not likely to benefit the patient.
   c. Reducing wait time of recipients of care.
   d. Caring for patients with respect and responsiveness to individual preferences.

In the past:

31. Have you observed a medical error in your clinical experiences?  A) Yes  B) No
32. Have you disclosed a medical error to a faculty member?  A) Yes  B) No
33. Have you disclosed a medical error to a staff member?  A) Yes  B) No
34. Have you disclosed a medical error to a fellow student?  A) Yes  B) No
35. Have you reported an error using an incident report?  A) Yes  B) No
36. Does your nursing program of study provide sufficient coverage on the topic of patient safety?  A) Yes  B) No

Demographic Information:

37. Age:
   A= 18-24 years
   B= 25-34 years
   C= 35-44 years
   D= 45-54 years
   E= 55 years and older

38. Gender:  A= Female
              B= Male

Prior or current work experience:

39. Nursing assistant:  A= Yes  B= No
40. Licensed Practical Nurse:  A= Yes  B= No
Appendix B

Systems Thinking Scale

Making Improvement

**Instructions:** Please read each of the statements and select the answer that indicates frequency of agreement with the statement.

<table>
<thead>
<tr>
<th>When I want to make an improvement ...</th>
<th>Most of the time</th>
<th>Often</th>
<th>Some of the time</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I seek everyone's view of the situation.</td>
<td></td>
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</tr>
<tr>
<td>2. I look beyond a specific event to determine the cause of the problem.</td>
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<tr>
<td>3. I think understanding how the chain of events occur is crucial.</td>
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<tr>
<td>4. I include people in my work unit to find a solution.</td>
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<tr>
<td>5. I think recurring patterns are more important than any one specific event.</td>
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<tr>
<td>6. I think of the problem at hand as a series of connected issues.</td>
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<tr>
<td>7. I consider the cause and effect that is occurring in a situation.</td>
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<tr>
<td>8. I consider the relationships among co-workers in the work unit.</td>
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<tr>
<td>9. I think that systems are constantly changing.</td>
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<tr>
<td>10. I propose solutions that affect the work environment, not specific individuals.</td>
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<tr>
<td>11. I keep in mind that proposed changes can affect the whole system.</td>
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</tr>
<tr>
<td>When I want to make an improvement ...</td>
<td>Most of the time</td>
<td>Often</td>
<td>Some of the time</td>
<td>Seldom</td>
<td>Never</td>
</tr>
<tr>
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<tr>
<td>12. I think more than one or two people are needed to have success.</td>
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<tr>
<td>13. I keep the mission and the purpose of the organization mind.</td>
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<tr>
<td>14. I think small changes can produce important results.</td>
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<tr>
<td>15. I think about how different employees might be affected by the improvement.</td>
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<tr>
<td>16. I try strategies that do not rely on people's memory.</td>
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<tr>
<td>17. I recognize system problems are influenced by past events.</td>
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<tr>
<td>18. I consider the past history and culture of the work unit.</td>
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<tr>
<td>19. I consider that the same action can have different effects over time, depending on the state of the system.</td>
<td></td>
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<tr>
<td>20. I consider that the same action can have different effects over time, depending on the state of the system.</td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
Appendix C

---

Louise Fura <laf55@case.edu>

DNP student_Request for 28 item questionnaire_KSA

Chenot, Theresa <tchenot@ju.edu>
To: Louise Fura <laf55@case.edu>
Cc: "Wendy.Madigosky@ucdenver.edu" <Wendy.Madigosky@ucdenver.edu>

Hi Louise - yes, you have my permission to use the adapted instrument with acknowledgement. Please keep us updated on your results.

Thank you - Dr. Teri Chenot

---

From: Louise Fura [laf55@case.edu]
Sent: Tuesday, August 28, 2012 9:14 PM
To: Chenot, Theresa
Subject: Re: DNP student_Request for 28 item questionnaire_KSA

(Quote text hidden)
Appendix D

Madigosky, Wendy <Wendy.Madigosky@ucdenver.edu>
To: WPMadigosky ma

Hi Louise-

Glad to hear from you! You certainly may use the questionnaires from our study with attribution—they are attached. However, you may also Assessment Curriculum Survey Questionnaire (HPPASQ). She validated this version and published this in the Journal for Nursing Education in Please keep me informed about your results and send my regards to Dr. Dolinsky.

Sincerely,

Wendy Madigosky MD MSPH | Director, Foundations of Doctoring Curriculum
University of Colorado Anschutz Medical Campus | School of Medicine
(303) 724-8429 | Wendy.Madigosky@ucdenver.edu | Building 500, Room B1317

---

From: Louise Pura [mailto:sp55@colorado.edu]
Sent: Tuesday, August 28, 2012 10:28 AM
To: Madigosky, Wendy
Subject: DNP student Request for 28 item questionnaire_KSA

---
Appendix E

Permission to use the Systems Thinking Scale
2 messages

Mary Dolansky <mad15@case.edu>
To: Louise Fura <lfur5@case.edu>

Dear Louise,

you have permission to use the Systems Thinking Scale.

good luck with your work.

Mary

Mary A. Dolansky, RN, PhD
Director, QSEN Institute
VA Quality Scholar Nurse Fellow
Associate Professor
Franciscan Payne Storer School of Nursing
Case Western Reserve University

11950 Euclid Ave
Cleveland, Ohio 44106
216-368-5668

Louise Fura <lfur5@case.edu>
To: Mary Dolansky <mad15@case.edu>

Dr. Dolansky,

Thank you for granting permission to use the Systems Thinking Scale in my research.

Have a good day!

On Tue, Mar 12, 2013 at 5:16 PM, Mary Dolansky <mad15@case.edu> wrote:

Dear Louise,

you have permission to use the Systems Thinking Scale.

good luck with your work.

Mary

Mary A. Dolansky, RN, PhD
Director, QSEN Institute
VA Quality Scholar Nurse Fellow
Associate Professor
Franciscan Payne Storer School of Nursing
Case Western Reserve University

11950 Euclid Ave
Cleveland, Ohio 44106
216-368-5668

94
Appendix F

ALVERNIA UNIVERSITY
BACHELOR of SCIENCE in NURSING PROGRAM
ON-CAMPUS CLINICAL EXPERIENCE
EVALUATION FORM
SPRING 2013

Instructions: Using the Scantron provided, rate the degree to which the objectives of the "On-campus Clinical Experience" were met:

<p>| OBJECTIVES                                                                 | Please use the scale below: |</p>
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify various methods that ensure recognition of patient safety risks.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>2. Demonstrate effective communication techniques when disclosing an error.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>3. Articulate awareness of strategies to mitigate harm through the systems approach.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>4. Apply quality improvement tools for process and system improvement.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

On the BACK (pink) side of the scantron, briefly answer the following questions:

1. Give one example of an approach to prevent a medical error?

2. Offer one way to improve this on campus clinical experience?
Appendix G

On-Campus Clinical Safety Educational Strategy

Objectives
1. Identify various methods that ensure recognition of patient safety risks.
2. Demonstrate effective communication techniques when disclosing an error.
3. Articulate awareness of strategies to mitigate harm through the systems approach.
4. Apply quality improvement tools for process and system improvement.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Scaffolding of Learning</th>
<th>Strategy Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theory Burst I: Patient Safety Risks</strong></td>
<td></td>
<td>Objective 1</td>
</tr>
<tr>
<td><strong>Description:</strong> This theory burst is designed to expose students to patient safety knowledge and the relationship to patient care and national healthcare initiatives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Audiovisual Activity</td>
<td>Peer and Faculty</td>
<td></td>
</tr>
<tr>
<td>• <em>The Josie King Story</em> Video</td>
<td>facilitated</td>
<td></td>
</tr>
<tr>
<td>(<a href="http://qsen.org/videos/">http://qsen.org/videos/</a>)</td>
<td></td>
<td></td>
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<tr>
<td>• Discussion: Recognition of risks to</td>
<td></td>
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<tr>
<td>Josie’s Safety</td>
<td></td>
<td></td>
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<tr>
<td>• PPT Presentation</td>
<td></td>
<td></td>
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<tr>
<td>• Introduction to importance of patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Significance of problem</td>
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<tr>
<td>• The Institute of Medicine Report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Significance of medical errors and causes of mortality (CDC)</td>
<td></td>
<td></td>
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<tr>
<td>• The Joint Commission top 10 sentinel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Where errors take place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Defining medication error</td>
<td></td>
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<tr>
<td>• Classifying medication errors</td>
<td></td>
<td></td>
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<tr>
<td>• Audiovisual Activity</td>
<td></td>
<td></td>
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<tr>
<td>• Student nurse medication error</td>
<td></td>
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<tr>
<td>• View link MSN student reflection on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>medication error as pre-licensure nursing student (IHI link)</td>
<td></td>
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</tr>
<tr>
<td><a href="http://www.ihi.org/offerings/ihiopenschool/resources/Pages/AudioandVideo/PerspectivesTheMistakePart2.aspx">http://www.ihi.org/offerings/ihiopenschool/resources/Pages/AudioandVideo/PerspectivesTheMistakePart2.aspx</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Scaffolding of Learning</td>
<td>Strategy Objective</td>
</tr>
<tr>
<td>----------</td>
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</tr>
</tbody>
</table>
| **Theory Burst II: Blameless Reporting System**  
Description: This theory burst focuses on how to communicate an error with a focus on creating a just culture in healthcare.  
- Audiovisual Activity  
  - Disclosure of medication error: Licensed professional nurse (MSN student) discusses an error that occurred in pre-licensure program  
    - Video link  
      http://www.youtube.com/watch?v=eAQBW2hsJhM\  
- PPT Presentation  
  Culture of blame versus a just culture  
- QI Activity  
  - Medication error case study medication error  
    - Brainstorm all factors contributing to the errors from nurse’s perspective  
    - Complete a mock adverse event report  
    - Discussion of adverse event report  
- Disclosure of medication error  
  - Role-play communication of error to healthcare member  
    - Description of the nature of the error  
    - When and where the error occurred  
    - Consequences of harm  
    - Completion of the adverse event report  
- Reflection on experience | Peer and Faculty facilitated | Objective 2 |

Peer and Faculty facilitated | Faculty facilitated |
<table>
<thead>
<tr>
<th>Activity</th>
<th>Scaffolding of Learning</th>
<th>Strategy Objective</th>
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| **Theory Burst III:** Patient Safety from a Systems Thinking Approach  
**Description:** This theory burst focuses on the benefits of systems thinking to assist healthcare professionals to improve patient safety. | | Objectives 3 and 4 |
| - Audiovisual Activity  
  • Define systems thinking  
    ▪ Dr. Berwick Institute for Healthcare Improvement (IHI) video  
    ▪ [http://www.ihi.org/offerings/ihiopenschool/resources/Pages/AudioVideo/PerspectivesTheMistakePart2.aspx](http://www.ihi.org/offerings/ihiopenschool/resources/Pages/AudioVideo/PerspectivesTheMistakePart2.aspx) | Peer and Faculty facilitated | |
| - PPT Presentation  
  • Examining patient safety from a systems thinking approach  
  • Discussion of benefits of systems thinking  
  • Quality Improvement Project (QIP) QSEN Tool Kit: Fishbone diagram | | |
| - QI Activity  
  • Examine medication error case study and complete fishbone diagram  
    ▪ Discussion of all factors contributing to medication error from a systems perspective | | |
| - PPT Presentation  
  • Systems thinking approach from across the facility and/or over time  
  • Leadership organizations establish a framework for improvement  
    ▪ American Nurse Association  
    ▪ The National Database of Nursing Quality Indicators (NDNQI®) video  
    ▪ [http://www.bing.com/videos/search?q=%e2%80%a2%09NDNQI+Video&mid=4890A2DEA742B96481E94890A2DEA742B96481E94890A2DEA742B96481E94890A2DEA742B96481E#view=detail&FORM=VIRE3](http://www.bing.com/videos/search?q=%e2%80%a2%09NDNQI+Video&mid=4890A2DEA742B96481E94890A2DEA742B96481E94890A2DEA742B96481E#view=detail&FORM=VIRE3) | | |
| - Future implications: Consider systemic improvement to improve patient safety | | |
Appendix H

The Impact of a Clinical Safety Educational Strategy on Undergraduate Baccalaureate Nursing Students' Knowledge, Skills, and Attitudes about Patient Safety and System's Thinking

Dear Student,

You are being invited to participate in a research study. The research study is part of the requirements for Professor Louise Fura's doctoral degree at Case Western Reserve University in Cleveland, Ohio. The research study will be conducted by Professor Fura and Dr. Kathleen Wisser, Assistant Professor of Nursing in the Undergraduate Nursing Program at Alvernia University.

The purpose of the study is to find out if there is a difference in nursing students' knowledge, skills, and attitudes about patient safety and systems thinking when sophomore and junior nursing students participate in a clinical safety educational strategy. Students will be asked to complete two pre-tests prior to participating in the clinical safety educational strategy and two post-tests after the activity.

Why You?

You were selected to participate in this research study because you are a sophomore, junior nursing student.

What are the risks?

There are minimal risks if you decide to participate in this study. If you should experience feelings of anxiety before or during the pre- or post-test, you can immediately stop and decline to participate in the study.

Completing the Tests

There are no costs to you for participating in this study. No one will be able to identify you or your answers and no one will know whether or not you participated in the study. No individual information will be disclosed.
The pre- and post-tests will take about 15 minutes each to complete. These tests are anonymous. You will record your answers on a ParScore Scantron sheet with the number section already completed. The numbers correspond to your nursing level—Sophomores are assigned numbers ranging from 000001 to 000065; Junior numbers range from 000100 to 000155. You can use any number as long as it corresponds to the correct class level. Do not write your name on the tests. All tests will be shredded after everyone completes the post-tests.

Benefits

The information collected may not benefit you directly, but the study's findings will be shared with faculty and other nurse colleagues via conference presentations or publication about the effectiveness of the on-campus clinical activity.

Your participation in this study is voluntary. By completing the ParScore Scantron(s), you are agreeing to participate. You are free to decline to answer a question if you do not wish to answer for any reason. If at any time you do not want to be a part of the study, you can opt out. However, if you are a sophomore or junior student, you will still participate in the mandatory on-campus clinical activity.

Pre- and post-test grades are not part of the grading scheme for NUR 205 (sophomores), NUR 317 (juniors). Declining to participate in the study will not affect your overall course or clinical grade(s), or progression in the program.

Compensation

Students who complete the pre-tests and post-tests will be eligible to win a gift card worth $25.00. After completing both pre-tests, you will be given a raffle ticket. You will retain one raffle ticket and deposit the matching raffle ticket in a container. You will not put any identifying information on the ticket. One winning ticket will be drawn by a volunteer student. The same procedure will be initiated after you complete both post-tests. If you opt out of the study by not completing the post-tests, you will not be eligible to win a gift card.
Who to Contact

If you have any questions about the study, please contact:

Louise Fura, MSN, CRNP                        Louise.fura@alvernia.edu
610.790.1966

Kathleen Z. Wisser, PhD, RN                  Kathleen.wisser@alvernia.edu
610.790.2853

The Alvernia University Institutional Review Board (IRB) has reviewed our request to conduct this study. If you have any concerns about your rights in this study, please contact Peggy Bowen, Ph.D., CTS, chair of the Alvernia University IRB at 610.796.8483.

Sincerely,

Louise Fura and Kathleen Z. Wisser